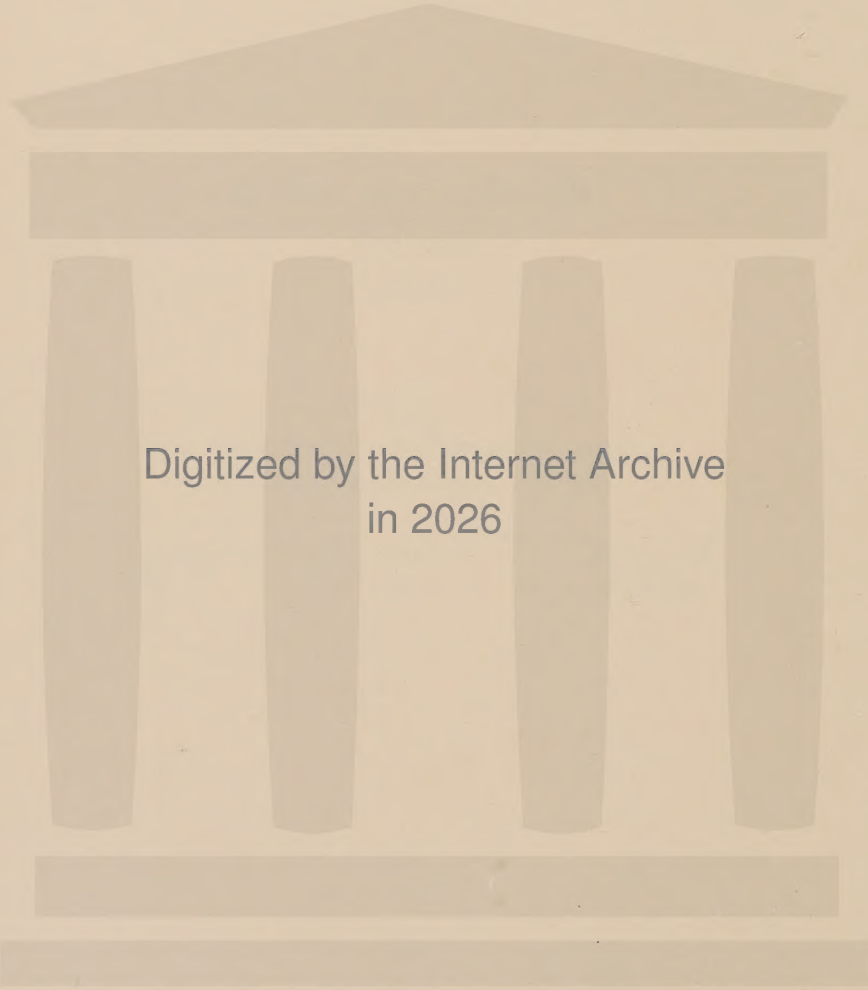




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THE
AMERICAN EPHEMERIS
AND
NAUTICAL ALMANAC

FOR THE YEAR 1958

ISSUED BY THE NAUTICAL ALMANAC OFFICE
UNITED STATES NAVAL OBSERVATORY, BY
DIRECTION OF THE SECRETARY
OF THE NAVY AND UNDER
THE AUTHORITY OF
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UNITED STATES
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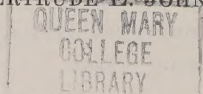
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PREFACE

This volume of the *American Ephemeris and Nautical Almanac* was prepared under the immediate supervision of G. M. CLEMENCE and EDGAR W. WOOLARD. The character and arrangement of the contents are the same as in the immediately preceding volume.

The fundamental constants and the basic tables used in the preparation of the volume are specified in the *Introduction*. They are in accordance with the international agreement resulting from the *Congrès International des Éphémérides Astronomiques* held at Paris in October 1911, and with resolutions of the *International Astronomical Union*.

Beginning with the volume for 1960, as recommended by the International Astronomical Union, the lunar ephemeris will be calculated directly from BROWN's theory instead of from his *Tables of the Motion of the Moon*. In order to make this improved ephemeris available for current years, a joint supplement to the *American Ephemeris* and the *British Nautical Almanac*, with the title *Improved Lunar Ephemeris 1952-1959*, has been prepared in co-operation with the Office of the *British Nautical Almanac*. In addition to the lunar ephemeris itself, giving hourly positions to $0^{\circ}.001$ in right ascension and $0''.01$ in declination, the supplement contains a description of the actual calculation, and a comparison of the positions with positions taken from BROWN's *Tables*. The supplement also includes daily values of nutation and aberration, computed on the improved basis recommended by the International Astronomical Union (*Trans. Int. Astr. Union*, VIII, 67, no. 15, 1954).

By international agreement authorized by law the following data have been received from abroad in exchange for material furnished by this office:

The Greenwich ephemerides of the Sun, Moon, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune, the geocentric ephemerides of Ceres, Pallas, Juno, Vesta, and Pluto, the nutation in longitude and obliquity, and local circumstances of occultations visible at five stations in the United States and one in Canada, from the Office of the *British Nautical Almanac*.

The elements of Saturn's rings, and the elongations of Saturn's satellites, from the office of the *Astronomisch-Geodätisches Jahrbuch*.

The apparent place of Polaris for Greenwich transit from the *International Astronomical Union*.

The conjunctions, phenomena, and configurations of Jupiter's satellites I-IV, from the office of the *Connaissance des Temps*.

The apparent places of 1535 stars are available in *Apparent Places of Fundamental Stars*, published annually under the auspices of the International Astronomical Union by Her Majesty's Stationery Office, London; the preparation of this volume is shared by the offices of the *Almanaque Nautico*, the *American Ephemeris*, the *Annuaire Astronomique*, the *Astronomisch-Geodätisches Jahrbuch*, the *Connaissance des Temps*, and the *British Nautical Almanac*.

In the office of the *American Ephemeris*, the following data were prepared by the members of the staff that are named and their assistants: eclipses of the Sun and the Moon, SIMONE DARO GOSSNER; apparent places of 162 stars for the *International Astronomical Union*, the Besselian and Independent Star Numbers, and Tables I, IV, and V, GLEN H. DRAPER; physical ephemerides of the Sun, Moon, and planets, the satellites of Mars, Uranus and Neptune, the differential coordinates of JVI, JVII, and Phoebe, the Planetary Configurations, and Tables VI-VIII, CHARLOTTE KRAMPE; elements for the prediction of occultations, ARMSTRONG THOMAS; local civil time of moonrise and moonset, RALPH F. HAUPT. The eclipse maps and the satellite diagrams were prepared by SIMONE DARO GOSSNER.

WASHINGTON, October 1955

F. A. GRAF,
Captain, U. S. Navy,
Superintendent Naval Observatory.

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ERRATA

The American Ephemeris, 1956

Page					
279	Footnote, No. 257	for	113°	read	103°

The American Ephemeris, 1957

xvii	Uranus, Mean Distance	for	19.181973	read	19.181956
xvii	Uranus, Sidereal Period in Tropical Years	for	84.01327	read	84.01316
xvii	Neptune, Mean Distance	for	30.057707	read	30.057743
xvii	Neptune, Sidereal Period in Tropical Years	for	164.79355	read	164.79385
264	Dec. 16.26, Log <i>C</i>	for	0.2665	read	0.2897
373	Dec. 23, Cat. No. 2968, Washington, <i>P</i>	for	53°	read	63°
374	Aug. 8, Cat. No. 2828, Long. +91° 0', Lat. +40° 0', <i>P</i>	for	53°	read	63°
376	Feb. 11, Cat. No. 971, Long. +120° 0', Lat. +36° 0', <i>P</i>	for	53°	read	63°

INTRODUCTION

This volume of the *American Ephemeris and Nautical Almanac* is similar in all respects to the one for 1957.

The sources of the basic data employed in the several parts of the volume are enumerated in the following paragraphs.

Part I.—The Sun's true geometric longitude referred to the mean equinox of date, latitude referred to the ecliptic of date, and radius vector, and the mean obliquity of date are taken from NEWCOMB's *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Volume VI, Part I.

The Moon's true longitude referred to the mean equinox of date, latitude referred to the ecliptic of date, and parallax are taken from BROWN's *Tables of the Motion of the Moon*, New Haven, 1919.

The heliocentric longitudes of Mercury, Venus, Mars, Uranus, and Neptune, referred to the mean equinox of date, their heliocentric latitudes referred to the ecliptic of date, and their radius vectors are taken from NEWCOMB's tables of these planets, *Astronomical Papers of the American Ephemeris*, Volume VI, Parts II, III, IV, Volume VII, Parts III and IV; for Mars the corrections derived by ROSS, *Astronomical Papers of the American Ephemeris*, Volume IX, Part II, are applied.

The heliocentric coordinates of Jupiter and Saturn, referred to the same origins, are taken from HILL's tables of these planets, *Astronomical Papers of the American Ephemeris*, Volume VII, Parts I and II.

The heliocentric coordinates of Pluto, referred to the mean equinox of 1950.0, are obtained by numerical integration from the following coordinates and velocity-components, referred to the mean equinox and equator 1950.0.

Epoch of osculation, 1930 September 20.0 U. T.=Julian Day 242 6239.5.

$x = -13.8576 \ 9445$
 $y = +35.5475 \ 6160$
 $z = +15.4272 \ 1370$

$x' = -0.4146 \ 0336$
 $y' = -0.3212 \ 8596$
 $z' = +0.0241 \ 7882$

They have been derived from the corresponding data referred to the mean equinox and equator 1900.0 given by E. C. BOWER with his orbit XIX in *Lick Observatory Bulletin* 437. The velocity-components are expressed in astronomical units per 200 days. The origin is at the barycenter of the Sun (with mass augmented by the four inner planets), Jupiter, Saturn, Uranus, and Neptune. For the numerical integration the mass of the Sun was augmented by the four inner planets, and special perturbations by Jupiter, Saturn, Uranus, and Neptune were included. The resulting rectangular coordinates were subtabulated to halves and then referred to the center of the Sun by applying the heliocentric coordinates of the barycenter.

The geocentric coordinates of Ceres, Pallas, Juno, and Vesta are derived from heliocentric rectangular coordinates taken from *Astronomical Papers of the American Ephemeris*, Volume XI, Part IV.

The tabulated semidiameter of the Sun is $16' 01''.50$ divided by the radius vector; that of the Moon is computed from the horizontal parallax by the formula $S = 0.272446 \pi + 0''.079$; and that of a planet is the value at unit distance given on page xvii divided by the distance from the Earth.

In deriving apparent places and other matter from the data mentioned above, the precession, constant of aberration, and solar parallax given on page xvi are used. The light time is computed from the value $498^s.38$ for unit distance, corresponding to the adopted constant of aberration.

The following formulas are employed for the nutation in longitude and obliquity:

Terms of Long Period		Terms of Short Period	
$\delta\psi = -$	$(17''.234 + 0''.017 T) \sin \Omega$	$-0''.204 \sin 2 \zeta$	
+	$0''.209 \sin 2 \Omega$	$+0''.011 \sin (\zeta + \Gamma')$	
-	$1''.272 \sin 2 L$	$+0''.068 \sin (\zeta - \Gamma')$	
+	$0''.126 \sin (L - \Gamma)$	$-0''.034 \sin (2 \zeta - \Omega)$	
-	$0''.050 \sin (3 L - \Gamma)$	$-0''.026 \sin (3 \zeta - \Gamma')$	
+	$0''.021 \sin (L + \Gamma)$	$+0''.015 \sin (\zeta - 2 L + \Gamma')$	
+	$0''.012 \sin (2 L - \Omega)$	$+0''.006 \sin 2 (\zeta - L)$	
+	$0''.005 \sin (2 \Gamma' - \Omega)$	$+0''.006 \sin (\zeta - \Gamma' + \Omega)$	
+	$0''.004 \sin 2 (L - \Gamma')$	$+0''.006 \sin (\zeta - \Gamma' - \Omega)$	
		$-0''.005 \sin (3 \zeta - 2 L + \Gamma')$	
		$-0''.004 \sin (3 \zeta - \Gamma' - \Omega)$	
		$+0''.003 \sin 2 (\zeta - \Gamma')$	
$\delta\epsilon = +$	$(9''.210 + 0''.0009 T) \cos \Omega$	$+0''.088 \cos 2 \zeta$	
-	$0''.090 \cos 2 \Omega$	$+0''.018 \cos (2 \zeta - \Omega)$	
+	$0''.551 \cos 2 L$	$+0''.011 \cos (3 \zeta - \Gamma')$	
+	$0''.022 \cos (3 L - \Gamma)$	$-0''.005 \cos (\zeta + \Gamma')$	
-	$0''.009 \cos (L + \Gamma)$	$-0''.003 \cos (\zeta - \Gamma' + \Omega)$	
-	$0''.007 \cos (2 L - \Omega)$	$+0''.003 \cos (\zeta - \Gamma' - \Omega)$	
-	$0''.003 \cos (2 \Gamma' - \Omega)$	$+0''.002 \cos (3 \zeta - 2 L + \Gamma')$	
		$+0''.002 \cos (3 \zeta - \Gamma' - \Omega)$	

In these formulas, T denotes centuries from 1900. The meanings of the other symbols are explained on page 247.

The effects of the terms of short period (those depending upon the Moon's mean longitude) are included only in the sidereal time of 0^h civil time, in the civil time of sidereal 0^h, and in the nutation in right ascension; they have been omitted from the apparent places and other related quantities.

Part II.—The formulas for the Besselian and Independent Star Numbers and precepts for their use in the reduction from mean to apparent place are given on pages 246 and 247. These formulas are intended to be strictly consistent with the values of precession, nutation, and constant of aberration used in Part I.

The mean places, annual variations, annual proper motions, and magnitudes of the stars are taken from KOPFF's *Dritter Fundamentalkatalog des Berliner Astronomischen Jahrbuchs* (FK3).

Part III.—The elements of eclipses of the Sun and Moon and occultations of stars by the Moon are given in accordance with BESSEL's method.

The values of the right ascension and declination of the Sun and Moon used in the prediction of eclipses, tabulated with an extra decimal, were furnished by the British Nautical Almanac Office, the effects of the short period terms of the nutation being included. A correction of $+1''.4$ has been applied to the mean longitude of the Sun; a correction of $-3''.0$ to the mean longitude of the Moon; and a correction of $-0''.5$ to the latitude of the Moon. These corrections are given below in the form of corrections to the true longitude of the Sun and to the true longitude and latitude of the Moon; also in the form of corrections to the right ascension and declination of the Sun and Moon. They have been assumed in each instance to be constant during the eclipse.

U. T. 1958		Sun			Moon			
	d	$\Delta\lambda$	$\Delta\alpha$	$\Delta\delta$	$\Delta\lambda$	$\Delta\beta$	$\Delta\alpha$	$\Delta\delta$
April	19	+1.39	+1.32	+0.50	-2.70	-0.26	-2.48	-1.20
May	3	+1.38	+1.36	+0.42	-3.39	-0.80	-3.59	+0.27
October	12	+1.41	+1.31	-0.53	-3.46	-0.81	-3.54	+0.57

The semidiameters of the Sun and Moon used in the calculation of eclipses do not include irradiation, and therefore differ from those used in computing the tabular values. The value for the Sun at unit distance is $15' 59''.63$ (AUWERS, *Astronomische Nachrichten*, 128, 367, 1891). That for the Moon is computed from $\sin S = 0.272274 \sin \pi$.

The mean places, annual variations, annual proper motions, and magnitudes of the stars occulted by the Moon are taken from ROBERTSON'S catalog, *Astronomical Papers of the American Ephemeris*, Volume X, Part II.

In the reduction from mean to apparent place of stars occulted by the Moon, the formulas on page 246 are used, the terms of short period being omitted in order to make the results consistent with the lunar ephemeris. Beginning with the volume for 1946 the term *E*, formerly omitted from the occultation data, is included.

In the computation of the elements of occultations a correction of $-3''.0$ has been applied to the mean longitude of the Moon. The semidiameter of the Moon is computed from $S=0.2725 \pi$.

Part IV.—In computing the physical ephemerides the value of the light time used is $498^s.58$ for unit distance, corresponding to the adopted values of the solar parallax and velocity of light on page xvi.

The elements used in the computation of the physical ephemeris of the Sun are those of CARRINGTON, *Observations of the Spots of the Sun*, pages 221, 244, 1863.

The elements of the Moon's orbit are computed from data given in BROWN'S *Tables of the Motion of the Moon*. The inclination of the Moon's mean equator to the ecliptic and the formulas for the physical libration of the Moon are those of F. HAYN, *Abh. d. Math.-Phys. Kl. d. K. Sächs. Ges. d. Wiss.*, XXX, page 49, 1907.

The stellar magnitudes of the planets are from the formulas of G. MUELLER in *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*, 8, 366, 1893.

The position of the north pole of Mars is as given by LOWELL and CROMMELIN, *Monthly Notices R. A. S.*, 66, 56, 1905; that of Jupiter is deduced from the position given for 1750 by DAMOISEAU, *Tables Écliptiques des Satellites de Jupiter*, Paris, 1836, page i. The longitudes of the central meridians of Mars and Jupiter have been continued from the last ephemerides published by MARTH, with unaltered rates of rotation; see *Monthly Notices R. A. S.*, 56, 403, 523, 1896, and 58, 472, 1898.

Part V.—The value of the light time used in computing the satellite data is the same as that used in Part IV, $498^s.58$.

The data for the satellites of Mars are derived from elements given by H. STRUVE, *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073.

The sources of the material on the satellites of Jupiter are:

I-IV, SAMPSON'S *Tables of the Four Great Satellites of Jupiter*, London, 1910, as modified by H. ANDOYER, *Bulletin Astronomique*, 32, 177, 1915.

V, Elements by J. ROBERTSON, in *Conn. des Temps* every year beginning with 1919.

VI and VII, J. BOBONE, *Astronomische Nachrichten*, 262, 321, 1937, and 263, 401, 1937.

The sources of the material on the satellites and rings of Saturn are:

I-VI, VIII, and rings, G. STRUVE, *Veröffentlichungen der Universitätssternwarte zu Berlin-Babelsberg*, VI, Parts 4 and 5, 1930.

VII, J. WOLTJER, Jr., *Annalen van de Sterrewacht te Leiden*, XVI, Part 3, page 64, 1928.

IX, F. E. ROSS, *Annals of Harvard College Observatory*, LIII, Number VI, 1905.

The apparent outer dimensions (*a* and *b*) of the outer ring are those of H. STRUVE, *Beobachtungen der Saturnstrabanten; Publications de l'Observatoire Central Nicolas*, XI, page 226; the relative dimensions of the rings are computed from BESSEL'S data, *Abhandlungen*, I, pages 110, 150, 319, except those of the dusky ring which are based on the observations of various astronomers.

The data for Ariel and Umbriel are derived from elements by NEWCOMB, *Uranian and Neptunian Systems, Washington Observations*, Appendix I, 1873; those for Titania and Oberon from elements by H. STRUVE, *Abh. d. K. Preuss. Akad. d. Wiss.*, 1912. Struve's elements of the plane of the orbits are adopted for all four satellites.

The data concerning Triton are derived from elements by W. S. EICHELBERGER and ARTHUR NEWTON, *Astronomical Papers of the American Ephemeris*, Volume IX, Part III.

Part VI.—The apparent places of Polaris are taken from *Apparent Places of Fundamental Stars*. The other astronomical data required for Part VI are taken from the preceding Parts.

CALENDAR, 1958

Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week	Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week
Jan.			2436					2436	
					Feb.	16.0	46.0	0.1259	250.5 Sun.
						17.0	47.0	0.1287	251.5 Mon.
						18.0	48.0	0.1314	252.5 Tue.
	1.0	0.0	0.0000	204.5 Wed.		19.0	49.0	0.1342	253.5 Wed.
	2.0	1.0	0.0027	205.5 Thu.		20.0	50.0	0.1369	254.5 Thu.
	3.0	2.0	0.0055	206.5 Fri.		21.0	51.0	0.1396	255.5 Fri.
	4.0	3.0	0.0082	207.5 Sat.		22.0	52.0	0.1424	256.5 Sat.
	5.0	4.0	0.0110	208.5 Sun.		23.0	53.0	0.1451	257.5 Sun.
	6.0	5.0	0.0137	209.5 Mon.		24.0	54.0	0.1478	258.5 Mon.
	7.0	6.0	0.0164	210.5 Tue.		25.0	55.0	0.1506	259.5 Tue.
	8.0	7.0	0.0192	211.5 Wed.		26.0	56.0	0.1533	260.5 Wed.
	9.0	8.0	0.0219	212.5 Thu.		27.0	57.0	0.1561	261.5 Thu.
	10.0	9.0	0.0246	213.5 Fri.		28.0	58.0	0.1588	262.5 Fri.
	11.0	10.0	0.0274	214.5 Sat.	Mar.	1.0	59.0	0.1615	263.5 Sat.
	12.0	11.0	0.0301	215.5 Sun.		2.0	60.0	0.1643	264.5 Sun.
	13.0	12.0	0.0329	216.5 Mon.		3.0	61.0	0.1670	265.5 Mon.
	14.0	13.0	0.0356	217.5 Tue.		4.0	62.0	0.1698	266.5 Tue.
	15.0	14.0	0.0383	218.5 Wed.		5.0	63.0	0.1725	267.5 Wed.
	16.0	15.0	0.0411	219.5 Thu.		6.0	64.0	0.1752	268.5 Thu.
	17.0	16.0	0.0438	220.5 Fri.		7.0	65.0	0.1780	269.5 Fri.
	18.0	17.0	0.0465	221.5 Sat.		8.0	66.0	0.1807	270.5 Sat.
	19.0	18.0	0.0493	222.5 Sun.		9.0	67.0	0.1834	271.5 Sun.
	20.0	19.0	0.0520	223.5 Mon.		10.0	68.0	0.1862	272.5 Mon.
	21.0	20.0	0.0548	224.5 Tue.		11.0	69.0	0.1889	273.5 Tue.
	22.0	21.0	0.0575	225.5 Wed.		12.0	70.0	0.1917	274.5 Wed.
	23.0	22.0	0.0602	226.5 Thu.		13.0	71.0	0.1944	275.5 Thu.
	24.0	23.0	0.0630	227.5 Fri.		14.0	72.0	0.1971	276.5 Fri.
	25.0	24.0	0.0657	228.5 Sat.		15.0	73.0	0.1999	277.5 Sat.
	26.0	25.0	0.0684	229.5 Sun.		16.0	74.0	0.2026	278.5 Sun.
	27.0	26.0	0.0712	230.5 Mon.		17.0	75.0	0.2053	279.5 Mon.
	28.0	27.0	0.0739	231.5 Tue.		18.0	76.0	0.2081	280.5 Tue.
	29.0	28.0	0.0767	232.5 Wed.		19.0	77.0	0.2108	281.5 Wed.
	30.0	29.0	0.0794	233.5 Thu.		20.0	78.0	0.2136	282.5 Thu.
	31.0	30.0	0.0821	234.5 Fri.		21.0	79.0	0.2163	283.5 Fri.
Feb.	1.0	31.0	0.0849	235.5 Sat.		22.0	80.0	0.2190	284.5 Sat.
	2.0	32.0	0.0876	236.5 Sun.		23.0	81.0	0.2218	285.5 Sun.
	3.0	33.0	0.0904	237.5 Mon.		24.0	82.0	0.2245	286.5 Mon.
	4.0	34.0	0.0931	238.5 Tue.		25.0	83.0	0.2272	287.5 Tue.
	5.0	35.0	0.0958	239.5 Wed.		26.0	84.0	0.2300	288.5 Wed.
	6.0	36.0	0.0986	240.5 Thu.		27.0	85.0	0.2327	289.5 Thu.
	7.0	37.0	0.1013	241.5 Fri.		28.0	86.0	0.2355	290.5 Fri.
	8.0	38.0	0.1040	242.5 Sat.		29.0	87.0	0.2382	291.5 Sat.
	9.0	39.0	0.1068	243.5 Sun.		30.0	88.0	0.2409	292.5 Sun.
	10.0	40.0	0.1095	244.5 Mon.		31.0	89.0	0.2437	293.5 Mon.
	11.0	41.0	0.1123	245.5 Tue.	Apr.	1.0	90.0	0.2464	294.5 Tue.
	12.0	42.0	0.1150	246.5 Wed.		2.0	91.0	0.2491	295.5 Wed.
	13.0	43.0	0.1177	247.5 Thu.		3.0	92.0	0.2519	296.5 Thu.
	14.0	44.0	0.1205	248.5 Fri.		4.0	93.0	0.2546	297.5 Fri.
	15.0	45.0	0.1232	249.5 Sat.		5.0	94.0	0.2574	298.5 Sat.

CALENDAR, 1958

xi

Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week	Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week
Apr.	6.0	95.0	0.2601	2436	May	25.0	144.0	0.3943	2436
	7.0	96.0	0.2628	299.5		26.0	145.0	0.3970	348.5
	8.0	97.0	0.2656	300.5		27.0	146.0	0.3997	349.5
	9.0	98.0	0.2683	301.5		28.0	147.0	0.4025	350.5
	10.0	99.0	0.2711	302.5		29.0	148.0	0.4052	351.5
	11.0	100.0	0.2738	303.5		30.0	149.0	0.4079	352.5
	12.0	101.0	0.2765	304.5		31.0	150.0	0.4107	353.5
				305.5					354.5
	13.0	102.0	0.2793	306.5	June	1.0	151.0	0.4134	355.5
	14.0	103.0	0.2820	307.5		2.0	152.0	0.4162	356.5
	15.0	104.0	0.2847	308.5		3.0	153.0	0.4189	357.5
	16.0	105.0	0.2875	309.5		4.0	154.0	0.4216	358.5
	17.0	106.0	0.2902	310.5		5.0	155.0	0.4244	359.5
	18.0	107.0	0.2930	311.5		6.0	156.0	0.4271	360.5
	19.0	108.0	0.2957	312.5		7.0	157.0	0.4299	361.5
						8.0	158.0	0.4326	362.5
	20.0	109.0	0.2984	313.5		9.0	159.0	0.4353	363.5
	21.0	110.0	0.3012	314.5		10.0	160.0	0.4381	364.5
	22.0	111.0	0.3039	315.5		11.0	161.0	0.4408	365.5
	23.0	112.0	0.3066	316.5		12.0	162.0	0.4435	366.5
	24.0	113.0	0.3094	317.5		13.0	163.0	0.4463	367.5
	25.0	114.0	0.3121	318.5		14.0	164.0	0.4490	368.5
	26.0	115.0	0.3149	319.5		15.0	165.0	0.4518	369.5
	27.0	116.0	0.3176	320.5		16.0	166.0	0.4545	370.5
	28.0	117.0	0.3203	321.5		17.0	167.0	0.4572	371.5
	29.0	118.0	0.3231	322.5		18.0	168.0	0.4600	372.5
May	30.0	119.0	0.3258	323.5		19.0	169.0	0.4627	373.5
	1.0	120.0	0.3285	324.5	July	20.0	170.0	0.4654	374.5
	2.0	121.0	0.3313	325.5		21.0	171.0	0.4682	375.5
	3.0	122.0	0.3340	326.5		22.0	172.0	0.4709	376.5
						23.0	173.0	0.4737	377.5
	4.0	123.0	0.3368	327.5		24.0	174.0	0.4764	378.5
	5.0	124.0	0.3395	328.5		25.0	175.0	0.4791	379.5
	6.0	125.0	0.3422	329.5		26.0	176.0	0.4819	380.5
	7.0	126.0	0.3450	330.5		27.0	177.0	0.4846	381.5
	8.0	127.0	0.3477	331.5		28.0	178.0	0.4873	382.5
	9.0	128.0	0.3505	332.5		29.0	179.0	0.4901	383.5
	10.0	129.0	0.3532	333.5		30.0	180.0	0.4928	384.5
						1.0	181.0	0.4956	385.5
	11.0	130.0	0.3559	334.5		2.0	182.0	0.4983	386.5
	12.0	131.0	0.3587	335.5		3.0	183.0	0.5010	387.5
	13.0	132.0	0.3614	336.5		4.0	184.0	0.5038	388.5
	14.0	133.0	0.3641	337.5		5.0	185.0	0.5065	389.5
	15.0	134.0	0.3669	338.5		6.0	186.0	0.5093	390.5
	16.0	135.0	0.3696	339.5		7.0	187.0	0.5120	391.5
	17.0	136.0	0.3724	340.5		8.0	188.0	0.5147	392.5
						9.0	189.0	0.5175	393.5
	18.0	137.0	0.3751	341.5		10.0	190.0	0.5202	394.5
	19.0	138.0	0.3778	342.5		11.0	191.0	0.5229	395.5
	20.0	139.0	0.3806	343.5		12.0	192.0	0.5257	396.5
	21.0	140.0	0.3833	344.5					
	22.0	141.0	0.3860	345.5					
	23.0	142.0	0.3888	346.5					
	24.0	143.0	0.3915	347.5					

Day of Month		Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week	Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week
July	13.0	193.0	0.5284	2436 397.5	Sun.	Aug.	31.0	242.0	2436 446.5	Sun.
	14.0	194.0	0.5312	398.5	Mon.	Sept.	1.0	243.0	447.5	Mon.
	15.0	195.0	0.5339	399.5	Tue.		2.0	244.0	448.5	Tue.
	16.0	196.0	0.5366	400.5	Wed.		3.0	245.0	449.5	Wed.
	17.0	197.0	0.5394	401.5	Thu.		4.0	246.0	450.5	Thu.
	18.0	198.0	0.5421	402.5	Fri.		5.0	247.0	451.5	Fri.
	19.0	199.0	0.5448	403.5	Sat.		6.0	248.0	452.5	Sat.
	20.0	200.0	0.5476	404.5	Sun.		7.0	249.0	453.5	Sun.
	21.0	201.0	0.5503	405.5	Mon.		8.0	250.0	454.5	Mon.
	22.0	202.0	0.5531	406.5	Tue.		9.0	251.0	455.5	Tue.
	23.0	203.0	0.5558	407.5	Wed.		10.0	252.0	456.5	Wed.
	24.0	204.0	0.5585	408.5	Thu.		11.0	253.0	457.5	Thu.
	25.0	205.0	0.5613	409.5	Fri.		12.0	254.0	458.5	Fri.
	26.0	206.0	0.5640	410.5	Sat.		13.0	255.0	459.5	Sat.
	27.0	207.0	0.5667	411.5	Sun.		14.0	256.0	460.5	Sun.
	28.0	208.0	0.5695	412.5	Mon.		15.0	257.0	461.5	Mon.
	29.0	209.0	0.5722	413.5	Tue.		16.0	258.0	462.5	Tue.
	30.0	210.0	0.5750	414.5	Wed.		17.0	259.0	463.5	Wed.
	31.0	211.0	0.5777	415.5	Thu.		18.0	260.0	464.5	Thu.
Aug.	1.0	212.0	0.5804	416.5	Fri.		19.0	261.0	465.5	Fri.
	2.0	213.0	0.5832	417.5	Sat.		20.0	262.0	466.5	Sat.
	3.0	214.0	0.5859	418.5	Sun.		21.0	263.0	467.5	Sun.
	4.0	215.0	0.5887	419.5	Mon.		22.0	264.0	468.5	Mon.
	5.0	216.0	0.5914	420.5	Tue.		23.0	265.0	469.5	Tue.
	6.0	217.0	0.5941	421.5	Wed.		24.0	266.0	470.5	Wed.
	7.0	218.0	0.5969	422.5	Thu.		25.0	267.0	471.5	Thu.
	8.0	219.0	0.5996	423.5	Fri.		26.0	268.0	472.5	Fri.
	9.0	220.0	0.6023	424.5	Sat.		27.0	269.0	473.5	Sat.
	10.0	221.0	0.6051	425.5	Sun.		28.0	270.0	474.5	Sun.
	11.0	222.0	0.6078	426.5	Mon.		29.0	271.0	475.5	Mon.
	12.0	223.0	0.6106	427.5	Tue.		30.0	272.0	476.5	Tue.
	13.0	224.0	0.6133	428.5	Wed.	Oct.	1.0	273.0	477.5	Wed.
	14.0	225.0	0.6160	429.5	Thu.		2.0	274.0	478.5	Thu.
	15.0	226.0	0.6188	430.5	Fri.		3.0	275.0	479.5	Fri.
	16.0	227.0	0.6215	431.5	Sat.		4.0	276.0	480.5	Sat.
	17.0	228.0	0.6242	432.5	Sun.		5.0	277.0	481.5	Sun.
	18.0	229.0	0.6270	433.5	Mon.		6.0	278.0	482.5	Mon.
	19.0	230.0	0.6297	434.5	Tue.		7.0	279.0	483.5	Tue.
	20.0	231.0	0.6325	435.5	Wed.		8.0	280.0	484.5	Wed.
	21.0	232.0	0.6352	436.5	Thu.		9.0	281.0	485.5	Thu.
	22.0	233.0	0.6379	437.5	Fri.		10.0	282.0	486.5	Fri.
	23.0	234.0	0.6407	438.5	Sat.		11.0	283.0	487.5	Sat.
	24.0	235.0	0.6434	439.5	Sun.		12.0	284.0	488.5	Sun.
	25.0	236.0	0.6461	440.5	Mon.		13.0	285.0	489.5	Mon.
	26.0	237.0	0.6489	441.5	Tue.		14.0	286.0	490.5	Tue.
	27.0	238.0	0.6516	442.5	Wed.		15.0	287.0	491.5	Wed.
	28.0	239.0	0.6544	443.5	Thu.		16.0	288.0	492.5	Thu.
	29.0	240.0	0.6571	444.5	Fri.		17.0	289.0	493.5	Fri.
	30.0	241.0	0.6598	445.5	Sat.		18.0	290.0	494.5	Sat.

Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week	Day of Month	Days since Jan. 1.0	Trop. yrs. since Jan. 1.0	Julian Date	Day of Week
			2436					2436	
Oct. 19.0	291.0	0.7967	495.5	Sun.	Dec. 7.0	340.0	0.9309	544.5	Sun.
20.0	292.0	0.7995	496.5	Mon.	8.0	341.0	0.9336	545.5	Mon.
21.0	293.0	0.8022	497.5	Tue.	9.0	342.0	0.9364	546.5	Tue.
22.0	294.0	0.8049	498.5	Wed.	10.0	343.0	0.9391	547.5	Wed.
23.0	295.0	0.8077	499.5	Thu.	11.0	344.0	0.9418	548.5	Thu.
24.0	296.0	0.8104	500.5	Fri.	12.0	345.0	0.9446	549.5	Fri.
25.0	297.0	0.8132	501.5	Sat.	13.0	346.0	0.9473	550.5	Sat.
26.0	298.0	0.8159	502.5	Sun.	14.0	347.0	0.9501	551.5	Sun.
27.0	299.0	0.8186	503.5	Mon.	15.0	348.0	0.9528	552.5	Mon.
28.0	300.0	0.8214	504.5	Tue.	16.0	349.0	0.9555	553.5	Tue.
29.0	301.0	0.8241	505.5	Wed.	17.0	350.0	0.9583	554.5	Wed.
30.0	302.0	0.8268	506.5	Thu.	18.0	351.0	0.9610	555.5	Thu.
31.0	303.0	0.8296	507.5	Fri.	19.0	352.0	0.9637	556.5	Fri.
Nov. 1.0	304.0	0.8323	508.5	Sat.	20.0	353.0	0.9665	557.5	Sat.
2.0	305.0	0.8351	509.5	Sun.	21.0	354.0	0.9692	558.5	Sun.
3.0	306.0	0.8378	510.5	Mon.	22.0	355.0	0.9720	559.5	Mon.
4.0	307.0	0.8405	511.5	Tue.	23.0	356.0	0.9747	560.5	Tue.
5.0	308.0	0.8433	512.5	Wed.	24.0	357.0	0.9774	561.5	Wed.
6.0	309.0	0.8460	513.5	Thu.	25.0	358.0	0.9802	562.5	Thu.
7.0	310.0	0.8488	514.5	Fri.	26.0	359.0	0.9829	563.5	Fri.
8.0	311.0	0.8515	515.5	Sat.	27.0	360.0	0.9856	564.5	Sat.
9.0	312.0	0.8542	516.5	Sun.	28.0	361.0	0.9884	565.5	Sun.
10.0	313.0	0.8570	517.5	Mon.	29.0	362.0	0.9911	566.5	Mon.
11.0	314.0	0.8597	518.5	Tue.	30.0	363.0	0.9939	567.5	Tue.
12.0	315.0	0.8624	519.5	Wed.	31.0	364.0	0.9966	568.5	Wed.
13.0	316.0	0.8652	520.5	Thu.					
14.0	317.0	0.8679	521.5	Fri.					
15.0	318.0	0.8707	522.5	Sat.					
16.0	319.0	0.8734	523.5	Sun.					
17.0	320.0	0.8761	524.5	Mon.					
18.0	321.0	0.8789	525.5	Tue.					
19.0	322.0	0.8816	526.5	Wed.					
20.0	323.0	0.8843	527.5	Thu.					
21.0	324.0	0.8871	528.5	Fri.					
22.0	325.0	0.8898	529.5	Sat.					
23.0	326.0	0.8926	530.5	Sun.					
24.0	327.0	0.8953	531.5	Mon.					
25.0	328.0	0.8980	532.5	Tue.					
26.0	329.0	0.9008	533.5	Wed.					
27.0	330.0	0.9035	534.5	Thu.					
28.0	331.0	0.9062	535.5	Fri.					
29.0	332.0	0.9090	536.5	Sat.					
30.0	333.0	0.9117	537.5	Sun.					
Dec. 1.0	334.0	0.9145	538.5	Mon.					
2.0	335.0	0.9172	539.5	Tue.					
3.0	336.0	0.9199	540.5	Wed.					
4.0	337.0	0.9227	541.5	Thu.					
5.0	338.0	0.9254	542.5	Fri.					
6.0	339.0	0.9282	543.5	Sat.					

ANNIVERSARIES AND FESTIVALS, 1958

New Year's Day.	Wednesday, Jan.	1
Epiphany.	Monday, Jan.	6
Septuagesima Sunday	Sunday, Feb.	2
Lincoln's Birthday.	Wednesday, Feb.	12
Quinquagesima (Shrove Sunday).	Sunday, Feb.	16
Ash Wednesday	Wednesday, Feb.	19
Washington's Birthday.	Saturday, Feb.	22
Palm Sunday	Sunday, Mar.	30
Good Friday	Friday, Apr.	4
First Day of Passover	Saturday, Apr.	5
Easter Sunday	Sunday, Apr.	6
Rogation Sunday	Sunday, May	11
Ascension Day	Thursday, May	15
Hebrew Pentecost (Shebuoth).	Sunday, May	25
Pentecost (Whit Sunday).	Sunday, May	25
Memorial Day	Friday, May	30
Trinity Sunday	Sunday, June	1
Corpus Christi	Thursday, June	5
Independence Day.	Friday, July	4
Labor Day	Monday, Sept.	1
Hebrew New Year (Rosh Hashanah).	Monday, Sept.	15
Day of Atonement (Yom Kippur)	Wednesday, Sept.	24
First Day of Feast of Tabernacles (Succoth)	Monday, Sept.	29
Columbus Day	Sunday, Oct.	12
General Election Day (except in certain States)	Tuesday, Nov.	4
Veterans Day	Tuesday, Nov.	11
Thanksgiving Day.	Thursday, Nov.	27
First Sunday in Advent.	Sunday, Nov.	30
Christmas Day	Thursday, Dec.	25

CHRONOLOGICAL ERAS AND CYCLES

CHRONOLOGICAL ERAS

The year 1958 of the Christian era comprises the latter part of the 182nd and the beginning of the 183rd year of the independence of the United States of America, and corresponds to the year 6671 of the Julian period.

January 1, 1958, Julian calendar, corresponds to January 14, 1958, Gregorian calendar.

The year 7467 of the Byzantine era begins on September 1, 1958, Julian calendar.

The year 5719 of the Jewish era begins at sunset on September 14, 1958, Gregorian calendar.

The year 2711 since the foundation of Rome, according to VARRO, begins on January 1, 1958, Julian calendar.

The year 2707 of the era of NABONASSAR begins on April 21, 1958, Julian calendar.

The year 2618 of the Japanese era, being the 33rd year of the period Showa, begins on January 1, 1958, Gregorian calendar.

The year 2270 of the Grecian era, or the era of the SELEUCIDÆ, begins in the present-day usage of the Syrians on September 1, 1958, or on October 1, 1958, Julian calendar, according to different sects.

The year 1675 of the era of DIOCLETIAN begins on August 29, 1958, Julian calendar.

The year 1378 of the Mohammedan era, or the era of the Hegira, begins at sunset on July 17, 1958, Gregorian calendar.

The Julian day 2 436 205 begins at Greenwich mean noon January 1, 1958, Gregorian calendar.

CHRONOLOGICAL CYCLES

Dominical Letter	E	Solar Cycle	7
Epact	10	Roman Indiction	11
Lunar Cycle or Golden Number	2	Julian Period	6671

ASTRONOMICAL CONSTANTS

Solar Parallax	8.80	} Paris Conference.	
Constant of Nutation	9.21		
Constant of Aberration	20.47		
	" "		
General Precession	50.2564+0.000	222(<i>t</i> -1900)	} Newcomb.
Precession in Right Ascension	46.0850+0.000	279(<i>t</i> -1900)	
Precession in Declination	20.0468-0.000	085(<i>t</i> -1900)	
Speed of Rotation of Ecliptic	0.4711-0.000	007(<i>t</i> -1900)	
	" "	" "	
Longitude of Ecliptic's Axis of Rotation (Ascending Node) . .	173 57 03.6	+32.862(<i>t</i> -1900)	}
Obliquity of the Ecliptic	23 27 08.26	-0.4684(<i>t</i> -1900)	
Equatorial Horizontal Parallax of the Moon at distance 60.2665 equatorial radii of the Earth			
		57' 02''.70 (Brown).	
Velocity of light 299 860 kilometers=186 324 statute miles per second (Newcomb and Michelson).			
Light travels unit distance in 498 ^a .580.†			
Gaussian Gravitation Constant, $k=0.017\ 202\ 098\ 950\ 000=3\ 548''.187\ 606\ 9651$ (Int. Astr. Union).			
Length of the year:			
Tropical (ordinary)	365.242 198	79-0.000 000 0614(<i>t</i> -1900)	} Newcomb.
Sidereal	365.256 360	42+0.000 000 0011(<i>t</i> -1900)	
Anomalistic	365.259 641	34+0.000 000 0304(<i>t</i> -1900)	
Eclipse	346.620 031	+0.000 000 32 (<i>t</i> -1900)	
Length of the month:‡			
Synodic (ordinary)	29.530 588	=29 12 44 02.8	} Brown.
Tropical	27.321 582	=27 07 43 04.7	
Sidereal	27.321 661	=27 07 43 11.5	
Anomalistic	27.554 550	=27 13 18 33.1	
Nodical	27.212 220	=27 05 05 35.8	
Length of the day:			
Mean Sidereal	23 56 04.09054	of mean solar time.	
Mean Solar	24 03 56.55536	of mean sidereal time.	
International Ellipsoid of Reference (Int. Union of Geodesy and Geophysics):			
*Flattening	$f=1/297=0.003\ 367\ 003\ 367\ 003\ 367$		
*Equatorial Radius	$a=6378\ 388$ meters		
Polar Radius	$a(1-f)=6356\ 911.946$ meters		
Square of eccentricity	$e^2=0.006\ 722\ 670\ 022\ 333\ 322$		
Reduction from geodetic latitude ϕ to geocentric latitude ϕ'			
$\phi' - \phi = -11' 35''.6635 \sin 2\phi + 1''.1731 \sin 4\phi - 0''.0026 \sin 6\phi$			
Radius vector			
$\rho = a(0.998\ 320\ 047 + 0.001\ 683\ 494 \cos 2\phi - 0.000\ 003\ 549 \cos 4\phi + 0.000\ 000\ 008 \cos 6\phi)$			
One degree of latitude			
111 136.54-562.21 $\cos 2\phi + 1.18 \cos 4\phi$ meters (ϕ =mid-latitude of arc)			
One degree of longitude			
111 417.66 $\cos \phi - 93.90 \cos 3\phi + 0.12 \cos 5\phi$ meters			
*Normal Gravity			
$g=978.0490(1+0.005\ 2884 \sin^2 \phi - 0.000\ 0059 \sin^2 2\phi)$ cm/sec ²			
Free-air gravity correction at an elevation of <i>H</i> meters			
$-(0.0003\ 0855 + 0.0000\ 0022 \cos 2\phi) H + 0.000\ 072 (H/1000)^2$ cm/sec ²			
Length of seconds pendulum			
0.993 5882-0.002 6203 $\cos 2\phi + 0.000\ 0029 \cos 4\phi$ meters			

**Adopted values, from which other quantities are derived.*

† For the values used in this volume, see the Introduction.

‡ For the epoch 1900. The secular variations do not exceed a few hundredths of a second per century, and depend partly upon the variations in the rate of rotation of the Earth.

ASTRONOMICAL CONSTANTS

SEMIDIAMETERS OF THE SUN, MOON, AND PLANETS

Name	At Unit Distance	At Mean Least Distance ²	Authority
Sun	15 59.63		Auwers, <i>A. N.</i> , 3068, 367 (1891).
Moon	15 32.58 ¹		Newcomb, <i>Ast. Pap. Am. Eph.</i> , IX, 39.
Mercury	3.34	5.45	Le Verrier, <i>Liouville's Jour.</i> , VIII, 279 (1843).
Venus	8.41	30.40	Auwers, <i>A. N.</i> , 3214, 361 (1894).
Mars	4.68	8.94	Hartwig, <i>Pub. d. Astr. Ges.</i> , XV, 77 (1879).
Jupiter (Equatorial)	1 38.47	23.43}	Sampson, <i>Tab. of the Four Great Satellites of</i>
Jupiter (Polar)	1 31.91	21.87}	<i>Jupiter</i> , xvi, xxi (1910).
Saturn (Equatorial)	1 23.33	9.76}	H. Struve, <i>Pub. de l'Obs. Cent. Nicolas</i> (II), XI,
Saturn (Polar)	1 14.57	8.73}	207 (1898).
Uranus	34.28	1.88	Weighted mean Barnard, <i>A. J.</i> , XVI, 75, 109
			(1896); See, <i>A. N.</i> 3768, 399 (1902); Wirtz,
			<i>Ann. d. K. Univ.-Sternw. Strassb.</i> , 4, II, 285
			(1912).
Neptune	36.56	1.26	Barnard, <i>A. N.</i> , 3760, 266 (1902).

ELEMENTS OF THE PLANETARY ORBITS FOR THE EPOCH JANUARY 0, 1958, G. M. N.

Name	Mean Dis- tance ¹	Sidereal Period in Tropical Years	Sidereal Mean Daily Motion "	Mean Synodic Period in Tropical Years	Eccen- tricity
♂ Mercury	0.387 099	0.240 85	14 732.420	0.317 26	0.205 6261
♀ Venus	0.723 332	0.615 21	5 767.670	1.598 72	0.006 7930
♁ Earth	1.000 000	1.000 04	3 548.193		0.016 7268
♂ Mars	1.523 691	1.880 89	1 886.519	2.135 39	0.093 3663
♃ Jupiter	5.202 803	11.862 23	299.128	1.092 11	0.048 4321
♄ Saturn	9.538 843	29.457 72	120.455	1.035 18	0.055 6887
♅ Uranus	19.181 951	84.013 12	42.235	1.012 09	0.047 2040
♆ Neptune	30.057 755	164.793 95	21.532	1.006 14	0.008 5732
♇ Pluto*	39.517 74	248.430 2	14.283	1.004 08	0.248 6438

Name	Inclina- tion to the Ecliptic " "	Mean Longi- tude of the Node " "	Mean Longi- tude of the Perihelion " "	Mean Longi- tude at the Epoch " "	Reciprocal Mass in Unit of Sun's Mass ⁴
♂ Mercury	7 00 14.2	47 50 00.3	76 48 07.1	111 05 38.55	6 000 000
♀ Venus	3 23 39.2	76 18 06.1	130 58 48.5	83 06 32.33	408 000
♁ Earth			102 13 05.1	99 38 59.76	329 390 ⁵
♂ Mars	1 50 59.8	49 14 01.0	335 17 09.1	235 40 16.56	3 093 500
♃ Jupiter	1 18 19.7	100 01 27.1	13 38 45.5	199 03 48.65	1 047.355
♄ Saturn	2 29 24.0	113 17 24.0	92 13 30.9	256 11 03.84	3 501.6
♅ Uranus	0 46 22.9	73 47 09.8	169 58 42.3	132 42 03.18	22 869
♆ Neptune	1 46 26.1	131 19 03.8	44 15 23.3	212 32 26.76	19 314 ⁶
♇ Pluto*	17 08 38.4	109 38 00.2	223 10 30.2	137 38 08.0	360 000

The elements of the four inner planets and of Uranus and Neptune are derived from those given by NEWCOMB in *Ast. Pap. Am. Eph.*, Vols. VI and VII, with the corrections for Mars given in Vol. IX, Part II, added, and are the same as those used in computing the ephemerides of these planets; the elements of Uranus and Neptune are affected by long period variations. Those of Jupiter and Saturn are taken from Vol. VII of the *Astronomical Papers* for the epoch of the tables, and reduced to 1958 by applying variations that approximate to those of LE VERRIER and GAILLOT; they are therefore not identical with the elements used in computing the ephemerides. The elements of Pluto are osculating barycentric elements computed from the coordinates and velocity-components on which the astrometric ephemeris is based (p. vii).*

* For epoch of osculation 1930 September 20.0 U. T., referred to the mean equinox and equator 1950.0.
¹ At mean distance. For the values used in this volume see the Introduction.
² By mean least distance is meant the difference between the mean distance and unity.
³ Calculated by Kepler's Third Law from the observed sidereal mean motion.
⁴ Mass includes atmosphere and satellites.
⁵ Earth/Moon=81.45. Sun/Earth=333 432.
⁶ The mass used in the theory of Uranus. In the other theories, a value of 19700 was used.

PART I

SUN, MOON, PLANETS

1

SUN, 1958
FOR 0^h UNIVERSAL TIME

Date	Day of the Week	Apparent Right Ascension				Apparent Declination			Semi- diameter	Hor. Par.	Equation of Time App.—Mean			Sidereal Time (Right Ascen- sion of Mean Sun+12 ^h)
		h	m	s		°	'	"	'	"	m	s	s	h m s
Jan.	0	Tu	18	39	24.33			—23 08 00.7	16 17.83	8.95	—2	47.31		6 36 37.012
	1	We	18	43	49.54	265.21		23 03 37.3 + 263.4	16 17.85	8.95	3	15.96	—28.65	6 40 33.568
	2	Th	18	48	14.44	264.90		22 58 46.2 291.1	16 17.86	8.95	3	44.30	28.34	6 44 30.126
	3	Fr	18	52	38.99	264.55		22 53 27.7 318.5	16 17.87	8.95	4	12.29	27.99	6 48 26.686
	4	Sa	18	57	03.17	264.18		22 47 41.8 345.9	16 17.87	8.95	4	39.91	27.62	6 52 23.248
					263.78			372.9					27.23	
	5	Su	19	01	26.95			—22 41 28.9	16 17.86	8.95	—5	07.14		6 56 19.811
	6	Mo	19	05	50.30	263.35		22 34 48.9 + 400.0	16 17.85	8.95	5	33.93	—26.79	7 00 16.373
	7	Tu	19	10	13.21	262.91		22 27 42.1 426.8	16 17.83	8.95	6	00.29	26.36	7 04 12.934
	8	We	19	14	35.66	262.45		22 20 08.8 453.3	16 17.80	8.95	6	26.17	25.88	7 08 09.492
	9	Th	19	18	57.61	261.95		22 12 09.0 479.8	16 17.77	8.95	6	51.57	25.40	7 12 06.048
					261.44			505.9					24.88	
	10	Fr	19	23	19.05			—22 03 43.1	16 17.73	8.95	—7	16.45		7 16 02.601
	11	Sa	19	27	39.96	260.91		21 54 51.3 + 531.8	16 17.69	8.95	7	40.80	—24.35	7 19 59.153
	12	Su	19	32	00.31	260.35		21 45 33.8 557.5	16 17.64	8.95	8	04.60	23.80	7 23 55.705
	13	Mo	19	36	20.09	259.78		21 35 50.8 583.0	16 17.59	8.95	8	27.82	23.22	7 27 52.259
	14	Tu	19	40	39.26	259.17		21 25 42.8 608.0	16 17.53	8.95	8	50.44	22.62	7 31 48.814
					258.56			632.9					22.00	
	15	We	19	44	57.82			—21 15 09.9	16 17.46	8.95	—9	12.44		7 35 45.373
	16	Th	19	49	15.74	257.92		21 04 12.4 + 657.5	16 17.39	8.95	9	33.81	—21.37	7 39 41.933
	17	Fr	19	53	33.00	257.26		20 52 50.8 681.6	16 17.32	8.94	9	54.50	20.69	7 43 38.494
	18	Sa	19	57	49.57	256.57		20 41 05.3 705.5	16 17.25	8.94	10	14.52	20.02	7 47 35.055
	19	Su	20	02	05.44	255.87		20 28 56.2 729.1	16 17.17	8.94	10	33.83	19.31	7 51 31.615
					255.14			752.3					18.59	
	20	Mo	20	06	20.58			—20 16 23.9	16 17.08	8.94	—10	52.42		7 55 28.173
	21	Tu	20	10	34.98	254.40		20 03 28.8 + 775.1	16 17.00	8.94	11	10.26	—17.84	7 59 24.730
	22	We	20	14	48.63	253.65		19 50 11.2 797.6	16 16.91	8.94	11	27.35	17.09	8 03 21.284
	23	Th	20	19	01.50	252.87		19 36 31.4 819.8	16 16.81	8.94	11	43.67	16.32	8 07 17.837
	24	Fr	20	23	13.58	252.08		19 22 29.9 841.5	16 16.72	8.94	11	59.20	15.53	8 11 14.388
					251.29			862.9					14.73	
	25	Sa	20	27	24.87			—19 08 07.0	16 16.61	8.94	—12	13.93		8 15 10.939
	26	Su	20	31	35.35	250.48		18 53 23.1 + 883.9	16 16.51	8.94	12	27.85	—13.92	8 19 07.490
	27	Mo	20	35	45.02	249.67		18 38 18.6 904.5	16 16.40	8.94	12	40.97	13.12	8 23 04.042
	28	Tu	20	39	53.86	248.84		18 22 53.9 924.7	16 16.29	8.94	12	53.25	12.28	8 27 00.595
	29	We	20	44	01.87	248.01		18 07 09.2 944.7	16 16.17	8.93	13	04.71	11.46	8 30 57.150
					247.18			964.0					10.62	
Feb.	30	Th	20	48	09.05			—17 51 05.2	16 16.04	8.93	—13	15.33		8 34 53.707
	31	Fr	20	52	15.40	246.35		17 34 42.1 + 983.1	16 15.92	8.93	13	25.12	—9.79	8 38 50.266
	1	Sa	20	56	20.91	245.51		17 18 00.3 1001.8	16 15.78	8.93	13	34.08	8.96	8 42 46.826
	2	Su	21	00	25.58	244.67		17 01 00.3 1020.0	16 15.65	8.93	13	42.20	8.12	8 46 43.387
	3	Mo	21	04	29.43	243.85		16 43 42.4 1037.9	16 15.50	8.93	13	49.49	7.29	8 50 39.946
					243.02			1055.5					6.47	
	4	Tu	21	08	32.45			—16 26 06.9	16 15.35	8.93	—13	55.96		8 54 36.503
	5	We	21	12	34.66	242.21		16 08 14.4 +1072.5	16 15.20	8.93	14	01.61	—5.65	8 58 33.058
	6	Th	21	16	36.06	241.40		15 50 05.1 1089.3	16 15.04	8.92	14	06.45	4.84	9 02 29.610
	7	Fr	21	20	36.66	240.60		15 31 39.5 1105.6	16 14.87	8.92	14	10.50	4.05	9 06 26.159
	8	Sa	21	24	36.46	239.80		15 12 58.0 1121.5	16 14.70	8.92	14	13.75	3.25	9 10 22.709
					239.03			1137.1					2.48	
	9	Su	21	28	35.49			—14 54 00.9	16 14.52	8.92	—14	16.23		9 14 19.260
	10	Mo	21	32	33.75	238.26		14 34 48.6 +1152.3	16 14.34	8.92	14	17.93	—1.70	9 18 15.812
	11	Tu	21	36	31.25	237.50		14 15 21.7 1166.9	16 14.16	8.92	14	18.88	0.95	9 22 12.367
	12	We	21	40	27.99	236.74		13 55 40.5 1181.2	16 13.97	8.91	14	19.06	—0.18	9 26 08.924
	13	Th	21	44	23.99	236.00		13 35 45.4 1195.1	16 13.77	8.91	14	18.51	+0.55	9 30 05.482
					235.26			1208.5					1.29	
	14	Fr	21	48	19.25			—13 15 36.9	16 13.58	8.91	—14	17.22		9 34 02.041
	15	Sa	21	52	13.79	234.54		—12 55 15.3 +1221.6	16 13.38	8.91	—14	15.20	+2.02	9 37 58.599

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h
		Mean Equinox of 1950.0		Ecliptic of 1950.0	Elliptic of 1958.0					
		°	'	"	"		"	"	s	h m s
Jan. 0	0	278 56 36.0				0.983 2999	-0.12	+11.08	+0.666	17 20 32.054
1	1	279 57 44.5	3668.5	3.32	0.31	0.983 2815	+0.02	11.12	0.666	17 16 36.143
2	2	280 58 52.9	3668.4	3.18	0.43	0.983 2689	0.16	11.15	0.669	17 12 40.229
3	3	282 00 01.2	3668.3	3.04	0.55	0.983 2623	0.29	11.18	0.674	17 08 44.314
4	4	283 01 09.2	3668.0	2.92	0.65	0.983 2619	0.43	11.21	0.680	17 04 48.397
			3667.9							
5	5	284 02 17.1		+2.82	-0.73	0.983 2679	0.57	+11.24	+0.688	17 00 52.480
6	6	285 03 24.8	3667.7	2.74	0.78	0.983 2804	0.71	11.27	0.695	16 56 56.565
7	7	286 04 32.5	3667.7	2.69	0.81	0.983 2995	0.84	11.30	0.700	16 53 00.652
8	8	287 05 40.1	3667.6	2.67	0.80	0.983 3252	0.98	11.33	0.703	16 49 04.741
9	9	288 06 47.6	3667.5	2.68	0.77	0.983 3572	1.12	11.35	0.703	16 45 08.834
			3667.5							
10	10	289 07 55.1		+2.72	-0.70	0.983 3955	1.26	+11.38	+0.701	16 41 12.927
11	11	290 09 02.7	3667.6	2.79	0.60	0.983 4396	1.40	11.41	0.698	16 37 17.021
12	12	291 10 10.2	3667.5	2.87	0.49	0.983 4894	1.53	11.43	0.695	16 33 21.114
13	13	292 11 17.7	3667.5	2.97	0.36	0.983 5444	1.67	11.45	0.693	16 29 25.205
14	14	293 12 25.2	3667.5	3.07	0.22	0.983 6043	1.81	11.47	0.693	16 25 29.293
			3667.3							
15	15	294 13 32.5		+3.18	-0.08	0.983 6687	1.95	+11.49	+0.696	16 21 33.380
16	16	295 14 39.6	3667.1	3.28	+0.05	0.983 7374	2.08	11.51	0.701	16 17 37.465
17	17	296 15 46.5	3666.9	3.36	0.16	0.983 8101	2.22	11.53	0.706	16 13 41.549
18	18	297 16 53.0	3666.5	3.40	0.24	0.983 8866	2.36	11.55	0.712	16 09 45.635
19	19	298 17 59.0	3666.0	3.42	0.30	0.983 9668	2.50	11.56	0.717	16 05 49.722
			3665.5							
20	20	299 19 04.5		+3.42	+0.33	0.984 0505	2.63	+11.58	+0.720	16 01 53.811
21	21	300 20 09.4	3664.9	3.39	0.34	0.984 1378	2.77	11.59	0.721	15 57 57.902
22	22	301 21 13.5	3664.1	3.33	0.32	0.984 2287	2.91	11.60	0.720	15 54 01.994
23	23	302 22 16.8	3663.3	3.24	0.27	0.984 3232	3.05	11.61	0.717	15 50 06.088
24	24	303 23 19.2	3662.4	3.13	0.20	0.984 4215	3.18	11.62	0.713	15 46 10.183
			3661.5							
25	25	304 24 20.7		+3.00	+0.11	0.984 5236	3.32	+11.63	+0.709	15 42 14.278
26	26	305 25 21.1	3660.4	2.85	+0.01	0.984 6298	3.46	11.63	0.704	15 38 18.373
27	27	306 26 20.4	3659.3	2.69	-0.11	0.984 7402	3.60	11.63	0.701	15 34 22.466
28	28	307 27 18.6	3658.2	2.53	0.22	0.984 8549	3.74	11.64	0.698	15 30 26.558
29	29	308 28 15.6	3657.0	2.36	0.34	0.984 9741	3.87	11.64	0.698	15 26 30.647
			3655.7							
30	30	309 29 11.3		+2.20	-0.45	0.985 0982	4.01	+11.63	+0.700	15 22 34.735
31	31	310 30 05.9	3654.6	2.06	0.55	0.985 2272	4.15	11.63	0.703	15 18 38.821
Feb. 1	32	311 30 59.1	3653.2	1.92	0.64	0.985 3614	4.29	11.63	0.708	15 14 42.906
2	33	312 31 51.1	3652.0	1.81	0.70	0.985 5010	4.42	11.62	0.714	15 10 46.992
3	34	313 32 41.8	3650.7	1.74	0.72	0.985 6463	4.56	11.61	0.717	15 06 51.080
			3649.6							
4	35	314 33 31.4		+1.69	-0.72	0.985 7974	4.70	+11.60	+0.719	15 02 55.170
5	36	315 34 19.8	3648.4	1.67	0.69	0.985 9543	4.84	11.59	0.718	14 58 59.264
6	37	316 35 07.0	3647.2	1.68	0.63	0.986 1169	4.97	11.58	0.715	14 55 03.359
7	38	317 35 53.2	3646.2	1.71	0.54	0.986 2851	5.11	11.56	0.709	14 51 07.455
8	39	318 36 38.3	3645.1	1.76	0.44	0.986 4588	5.25	11.55	0.703	14 47 11.551
			3644.2							
9	40	319 37 22.5		+1.84	-0.31	0.986 6375	5.39	+11.53	+0.699	14 43 15.645
10	41	320 38 05.6	3643.1	1.91	0.18	0.986 8208	5.52	11.51	0.696	14 39 19.737
11	42	321 38 47.7	3642.1	1.98	-0.05	0.987 0084	5.66	11.49	0.695	14 35 23.827
12	43	322 39 28.8	3641.1	2.06	+0.08	0.987 2000	5.80	11.47	0.697	14 31 27.915
13	44	323 40 08.8	3640.0	2.11	0.19	0.987 3950	5.94	11.44	0.700	14 27 32.002
			3638.9							
14	45	324 40 47.7		+2.14	+0.28	0.987 5933	6.07	+11.42	+0.704	14 23 36.089
15	46	325 41 25.4	3637.7	+2.15	+0.34	0.987 7944	6.21	+11.39	+0.706	14 19 40.178

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

SUN, 1958
FOR 0^h UNIVERSAL TIME

Date	Day of the Week	Apparent Right Ascension			Apparent Declination			Semi- diameter	Hor. Par.	Equation of Time App.—Mean			Sidereal Time (Right Ascension of Mean Sun+12 ^h)		
		h	m	s	°	'	"	'	"	"	m	s	h	m	s
Feb.	15	Sa	21 52	13.79 ^s	-12 55	15.3	"	16 13.38	8.91	-14 15.20 ^s			9 37	58.599	
	16	Su	21 56 07.60 ^{233.81}		12 34 41.2 ^{+1234.1}			16 13.18	8.91	14 12.45 ^{+ 2.75}			9 41	55.155	
	17	Mo	22 00 00.70 ^{233.10}		12 13 54.9 ^{1246.3}			16 12.98	8.91	14 09.00 ^{1258.0}			9 45	51.709	
	18	Tu	22 03 53.09 ^{232.39}		11 52 56.9 ^{1269.2}			16 12.77	8.90	14 04.84 ^{1269.2}			9 49	48.261	
	19	We	22 07 44.79 ^{231.70}		11 31 47.7 ^{1280.2}			16 12.56	8.90	13 59.99 ^{1280.2}			9 53	44.812	
	20	Th	22 11 35.81 ^{231.02}		-11 10 27.5			16 12.35	8.90	-13 54.46 ^{5.53}			9 57	41.361	
	21	Fr	22 15 26.16 ^{230.35}		10 48 56.9 ^{+1290.6}			16 12.14	8.90	13 48.25 ^{+ 6.21}			10 01	37.909	
	22	Sa	22 19 15.84 ^{229.68}		10 27 16.3 ^{1300.6}			16 11.93	8.90	13 41.38 ^{6.87}			10 05	34.458	
	23	Su	22 23 04.88 ^{229.04}		10 05 26.1 ^{1310.2}			16 11.71	8.89	13 33.87 ^{7.51}			10 09	31.007	
	24	Mo	22 26 53.29 ^{228.41}		9 43 26.8 ^{1319.3}			16 11.50	8.89	13 25.72 ^{8.15}			10 13	27.556	
Mar.	25	Tu	22 30 41.07 ^{227.78}		- 9 21 18.7 ^{1328.1}			16 11.28	8.89	-13 16.95 ^{8.77}			10 17	24.108	
	26	We	22 34 28.24 ^{227.17}		8 59 02.2 ^{+1336.5}			16 11.05	8.89	13 07.57 ^{+ 9.38}			10 21	20.661	
	27	Th	22 38 14.83 ^{226.59}		8 36 37.8 ^{1344.4}			16 10.83	8.89	12 57.60 ^{9.97}			10 25	17.217	
	28	Fr	22 42 00.84 ^{226.01}		8 14 05.9 ^{1351.9}			16 10.60	8.88	12 47.06 ^{10.64}			10 29	13.774	
	1	Sa	22 45 46.29 ^{225.45}		7 51 26.9 ^{1359.0}			16 10.37	8.88	12 35.96 ^{11.10}			10 33	10.332	
	2	Su	22 49 31.21 ^{224.92}		- 7 28 41.1 ^{1365.8}			16 10.14	8.88	-12 24.32 ^{11.64}			10 37	06.889	
	3	Mo	22 53 15.60 ^{224.39}		7 05 48.9 ^{+1372.2}			16 09.90	8.88	12 12.16 ^{+12.16}			10 41	03.445	
	4	Tu	22 56 59.50 ^{223.90}		6 42 50.8 ^{1378.1}			16 09.66	8.87	11 59.51 ^{12.65}			10 44	59.998	
	5	We	23 00 42.92 ^{223.42}		6 19 47.0 ^{1383.8}			16 09.41	8.87	11 46.38 ^{13.13}			10 48	56.549	
	6	Th	23 04 25.89 ^{222.97}		5 56 38.0 ^{1389.0}			16 09.17	8.87	11 32.80 ^{13.58}			10 52	53.097	
	7	Fr	23 08 08.44 ^{222.55}		- 5 33 24.1 ^{1393.9}			16 08.92	8.87	-11 18.79 ^{14.01}			10 56	49.645	
	8	Sa	23 11 50.58 ^{222.14}		5 10 05.7 ^{+1398.4}			16 08.66	8.87	11 04.38 ^{+14.41}			11 00	46.193	
	9	Su	23 15 32.34 ^{221.76}		4 46 43.0 ^{1402.7}			16 08.40	8.86	10 49.59 ^{14.79}			11 04	42.742	
	10	Mo	23 19 13.76 ^{221.42}		4 23 16.7 ^{1406.3}			16 08.14	8.86	10 34.45 ^{15.14}			11 08	39.295	
	11	Tu	23 22 54.83 ^{221.07}		3 59 46.9 ^{1409.8}			16 07.88	8.86	10 18.98 ^{15.47}			11 12	35.849	
	12	We	23 26 35.60 ^{220.77}		- 3 36 14.0 ^{1412.9}			16 07.61	8.86	-10 03.19 ^{15.79}			11 16	32.406	
	13	Th	23 30 16.08 ^{220.48}		3 12 38.4 ^{+1415.6}			16 07.34	8.85	9 47.12 ^{+16.07}			11 20	28.963	
	14	Fr	23 33 56.28 ^{220.20}		2 49 00.6 ^{1417.8}			16 07.08	8.85	9 30.77 ^{16.35}			11 24	25.520	
	15	Sa	23 37 36.24 ^{219.96}		2 25 20.9 ^{1419.7}			16 06.81	8.85	9 14.17 ^{16.60}			11 28	22.075	
	16	Su	23 41 15.96 ^{219.72}		2 01 39.6 ^{1421.3}			16 06.53	8.85	8 57.34 ^{16.83}			11 32	18.628	
	17	Mo	23 44 55.46 ^{219.50}		- 1 37 57.3 ^{1422.3}			16 06.26	8.84	- 8 40.29 ^{17.05}			11 36	15.179	
	18	Tu	23 48 34.77 ^{219.31}		1 14 14.1 ^{+1423.2}			16 05.99	8.84	8 23.05 ^{+17.24}			11 40	11.728	
	19	We	23 52 13.90 ^{219.13}		0 50 30.7 ^{1423.4}			16 05.72	8.84	8 05.63 ^{17.42}			11 44	08.276	
	20	Th	23 55 52.87 ^{218.97}		0 26 47.2 ^{1423.5}			16 05.45	8.84	7 48.04 ^{17.59}			11 48	04.823	
	21	Fr	23 59 31.69 ^{218.82}		- 0 03 04.2 ^{1423.0}			16 05.18	8.83	7 30.31 ^{17.73}			11 52	01.370	
	22	Sa	0 03 10.39 ^{218.70}		+ 0 20 38.1 ^{1422.3}			16 04.91	8.83	- 7 12.46 ^{17.85}			11 55	57.918	
	23	Su	0 06 48.97 ^{218.58}		0 44 19.3 ^{+1421.2}			16 04.64	8.83	6 54.49 ^{+17.97}			11 59	54.467	
	24	Mo	0 10 27.46 ^{218.49}		1 07 58.9 ^{1419.6}			16 04.36	8.83	6 36.43 ^{18.06}			12 03	51.017	
	25	Tu	0 14 05.88 ^{218.42}		1 31 36.6 ^{1417.7}			16 04.09	8.82	6 18.30 ^{18.13}			12 07	47.568	
	26	We	0 17 44.24 ^{218.36}		1 55 12.0 ^{1415.4}			16 03.82	8.82	6 00.11 ^{18.19}			12 11	44.122	
	27	Th	0 21 22.57 ^{218.33}		+ 2 18 44.9 ^{1412.9}			16 03.56	8.82	- 5 41.88 ^{18.23}			12 15	40.678	
	28	Fr	0 25 00.87 ^{218.30}		2 42 14.7 ^{+1409.8}			16 03.29	8.82	5 23.63 ^{+18.25}			12 19	37.234	
	29	Sa	0 28 39.16 ^{218.29}		3 05 41.2 ^{1406.5}			16 03.02	8.81	5 05.37 ^{18.26}			12 23	33.791	
	30	Su	0 32 17.48 ^{218.32}		3 29 04.0 ^{1402.8}			16 02.75	8.81	4 47.14 ^{18.23}			12 27	30.347	
	31	Mo	0 35 55.83 ^{218.35}		3 52 22.7 ^{1398.7}			16 02.48	8.81	4 28.94 ^{18.20}			12 31	26.900	
Apr.	1	Tu	0 39 34.24 ^{218.41}		+ 4 15 37.1 ^{1394.4}			16 02.20	8.81	- 4 10.79 ^{18.15}			12 35	23.451	
	2	We	0 43 12.73 ^{218.49}		+ 4 38 46.7 ^{+1389.6}			16 01.93	8.80	- 3 52.73 ^{+18.06}			12 39	20.000	

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h
		Mean Equinox of 1950.0		Eclip- tic of 1950.0	Eclip- tic of 1958.0					
		°	' "	"	"		"	"	s	h m s
Feb. 15	46	325 41 25.4	3636.4	+2.15	+0.34	0.987 7944	6.21	+11.39	+0.706	14 19 40.178
16	47	326 42 01.8	3635.0	2.12	0.37	0.987 9982	6.35	11.36	0.707	14 15 44.269
17	48	327 42 36.8	3633.6	2.06	0.37	0.988 2045	6.49	11.33	0.705	14 11 48.362
18	49	328 43 10.4	3632.2	1.97	0.34	0.988 4132	6.63	11.30	0.702	14 07 52.457
19	50	329 43 42.6	3630.5	1.86	0.29	0.988 6240	6.76	11.27	0.697	14 03 56.554
20	51	330 44 13.1	3628.9	+1.73	+0.22	0.988 8369	6.90	+11.23	+0.691	14 00 00.651
21	52	331 44 42.0	3627.2	1.58	0.13	0.989 0520	7.04	11.20	0.684	13 56 04.748
22	53	332 45 09.2	3625.4	1.41	+0.02	0.989 2693	7.18	11.16	0.677	13 52 08.846
23	54	333 45 34.6	3623.6	1.23	-0.10	0.989 4888	7.31	11.12	0.671	13 48 12.942
24	55	334 45 58.2	3621.6	1.04	0.23	0.989 7106	7.45	11.08	0.665	13 44 17.037
25	56	335 46 19.8	3619.8	+0.85	-0.35	0.989 9348	7.59	+11.04	+0.661	13 40 21.130
26	57	336 46 39.6	3617.7	0.67	0.47	0.990 1614	7.73	10.99	0.659	13 36 25.222
27	58	337 46 57.3	3615.7	0.50	0.58	0.990 3908	7.86	10.95	0.660	13 32 29.311
28	59	338 47 13.0	3613.7	0.34	0.67	0.990 6230	8.00	10.91	0.662	13 28 33.399
Mar. 1	60	339 47 26.7	3611.6	0.22	0.73	0.990 8582	8.14	10.86	0.664	13 24 37.487
2	61	340 47 38.3	3609.7	+0.11	-0.77	0.991 0967	8.28	+10.81	+0.666	13 20 41.577
3	62	341 47 48.0	3607.5	+0.04	0.78	0.991 3388	8.41	10.76	0.666	13 16 45.668
4	63	342 47 55.5	3605.7	0.00	0.75	0.991 5846	8.55	10.71	0.664	13 12 49.763
5	64	343 48 01.2	3603.7	-0.01	0.70	0.991 8343	8.69	10.66	0.659	13 08 53.859
6	65	344 48 04.9	3602.0	+0.01	0.62	0.992 0880	8.83	10.61	0.652	13 04 57.957
7	66	345 48 06.9	3600.1	+0.05	-0.51	0.992 3456	8.97	+10.56	+0.644	13 01 02.055
8	67	346 48 07.0	3598.5	0.11	0.39	0.992 6069	9.10	10.51	0.637	12 57 06.152
9	68	347 48 05.5	3596.7	0.18	0.25	0.992 8717	9.24	10.46	0.631	12 53 10.247
10	69	348 48 02.2	3595.2	0.25	-0.11	0.993 1396	9.38	10.40	0.628	12 49 14.340
11	70	349 47 57.4	3593.5	0.32	+0.02	0.993 4103	9.52	10.35	0.628	12 45 18.430
12	71	350 47 50.9	3591.9	+0.36	+0.13	0.993 6833	9.65	+10.29	+0.629	12 41 22.519
13	72	351 47 42.8	3590.2	0.38	0.21	0.993 9583	9.79	10.24	0.631	12 37 26.607
14	73	352 47 33.0	3588.6	0.39	0.28	0.994 2349	9.93	10.18	0.632	12 33 30.697
15	74	353 47 21.6	3586.8	0.36	0.32	0.994 5127	10.07	10.13	0.632	12 29 34.789
16	75	354 47 08.4	3585.0	0.30	0.33	0.994 7914	10.20	10.07	0.629	12 25 38.883
17	76	355 46 53.4	3583.3	+0.22	+0.31	0.995 0708	10.34	+10.01	+0.625	12 21 42.979
18	77	356 46 36.7	3581.3	+0.10	0.26	0.995 3506	10.48	9.96	0.619	12 17 47.077
19	78	357 46 18.0	3579.4	-0.04	0.18	0.995 6306	10.62	9.90	0.611	12 13 51.175
20	79	358 45 57.4	3577.5	0.21	+0.08	0.995 9106	10.75	9.84	0.603	12 09 55.274
21	80	359 45 34.9	3575.4	0.38	-0.03	0.996 1906	10.89	9.78	0.595	12 05 59.372
22	81	0 45 10.3	3573.2	-0.57	-0.15	0.996 4704	11.03	+ 9.72	+0.587	12 02 03.470
23	82	1 44 43.5	3571.2	0.77	0.28	0.996 7500	11.17	9.67	0.580	11 58 07.567
24	83	2 44 14.7	3569.0	0.96	0.42	0.997 0295	11.30	9.61	0.575	11 54 11.662
25	84	3 43 43.7	3566.7	1.15	0.54	0.997 3087	11.44	9.55	0.572	11 50 15.755
26	85	4 43 10.4	3564.4	1.32	0.65	0.997 5878	11.58	9.50	0.570	11 46 19.846
27	86	5 42 34.8	3562.2	-1.49	-0.75	0.997 8670	11.72	+ 9.44	+0.570	11 42 23.935
28	87	6 41 57.0	3559.8	1.63	0.82	0.998 1463	11.86	9.38	0.571	11 38 28.025
29	88	7 41 16.8	3557.5	1.73	0.87	0.998 4259	11.99	9.32	0.573	11 34 32.114
30	89	8 40 34.3	3555.1	1.82	0.89	0.998 7060	12.13	9.27	0.573	11 30 36.205
31	90	9 39 49.4	3552.8	1.86	0.87	0.998 9869	12.27	9.21	0.571	11 26 40.299
Apr. 1	91	10 39 02.2	3550.5	-1.88	-0.82	0.999 2688	12.41	+ 9.16	+0.567	11 22 44.395
2	92	11 38 12.7		-1.86	-0.74	0.999 5520	12.54	+ 9.11	+0.560	11 18 48.493

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

FOR 0^h UNIVERSAL TIME

Date	Day of the Week	Apparent Right Ascension	Apparent Declination	Semi- diameter	Hor. Par.	Equation of Time App.—Mean	Sidereal Time (Right Ascension of Mean Sun+12 ^h)
		h m s	° ' "	' "	"	m s	h m s
Apr. 1	Tu	0 39 34.24 ^s	+ 4 15 37.1 ["]	16 02.20	8.81	-4 10.79 ^s	12 35 23.451
2	We	0 43 12.73 ^{218.49}	4 38 46.7 ^{+1389.6}	16 01.93	8.80	3 52.73 ^{+18.06}	12 39 20.000
3	Th	0 46 51.31 ^{218.58}	5 01 51.3 ^{1384.6}	16 01.66	8.80	3 34.76 ^{17.97}	12 43 16.548
4	Fr	0 50 30.03 ^{218.72}	5 24 50.5 ^{1379.2}	16 01.38	8.80	3 16.93 ^{17.83}	12 47 13.095
5	Sa	0 54 08.89 ^{218.86}	5 47 44.1 ^{1373.6}	16 01.11	8.80	2 59.24 ^{17.69}	12 51 09.644
6	Su	0 57 47.93 ^{219.04}	+ 6 10 31.6 ^{1367.5}	16 00.83	8.79	-2 41.73 ^{17.51}	12 55 06.196
7	Mo	1 01 27.17 ^{219.24}	6 33 12.8 ^{+1361.2}	16 00.55	8.79	2 24.41 ^{+17.32}	12 59 02.750
8	Tu	1 05 06.62 ^{219.45}	6 55 47.3 ^{1354.5}	16 00.27	8.79	2 07.31 ^{17.10}	13 02 59.307
9	We	1 08 46.32 ^{219.70}	7 18 14.9 ^{1347.6}	15 59.99	8.79	1 50.46 ^{16.85}	13 06 55.865
10	Th	1 12 26.28 ^{219.96}	7 40 35.1 ^{1340.2}	15 59.71	8.78	1 33.86 ^{16.60}	13 10 52.423
11	Fr	1 16 06.51 ^{220.23}	+ 8 02 47.6 ^{1332.5}	15 59.43	8.78	-1 17.55 ^{16.31}	13 14 48.979
12	Sa	1 19 47.05 ^{220.54}	8 24 52.1 ^{+1324.5}	15 59.15	8.78	1 01.53 ^{+16.02}	13 18 45.534
13	Su	1 23 27.88 ^{220.83}	8 46 48.3 ^{1316.2}	15 58.88	8.78	0 45.81 ^{15.72}	13 22 42.086
14	Mo	1 27 09.05 ^{221.17}	9 08 35.7 ^{1307.4}	15 58.60	8.77	0 30.42 ^{15.39}	13 26 38.637
15	Tu	1 30 50.56 ^{221.51}	9 30 14.1 ^{1298.4}	15 58.33	8.77	0 15.38 ^{15.04}	13 30 35.185
16	We	1 34 32.41 ^{221.85}	+ 9 51 43.1 ^{1289.0}	15 58.06	8.77	-0 00.68 ^{14.70}	13 34 31.733
17	Th	1 38 14.64 ^{222.23}	10 13 02.3 ^{+1279.2}	15 57.79	8.77	+0 13.64 ^{+14.32}	13 38 28.281
18	Fr	1 41 57.24 ^{222.60}	10 34 11.4 ^{1269.1}	15 57.52	8.76	0 27.59 ^{13.95}	13 42 24.830
19	Sa	1 45 40.24 ^{223.00}	10 55 10.1 ^{1258.7}	15 57.26	8.76	0 41.15 ^{13.56}	13 46 21.380
20	Su	1 49 23.64 ^{223.40}	11 15 57.9 ^{1247.8}	15 57.00	8.76	0 54.31 ^{13.16}	13 50 17.931
21	Mo	1 53 07.44 ^{223.80}	+11 36 34.7 ^{1236.8}	15 56.74	8.76	+1 07.05 ^{12.74}	13 54 14.483
22	Tu	1 56 51.68 ^{224.24}	11 56 59.9 ^{+1225.2}	15 56.48	8.75	1 19.37 ^{+12.32}	13 58 11.038
23	We	2 00 36.34 ^{224.66}	12 17 13.4 ^{1213.5}	15 56.23	8.75	1 31.27 ^{11.90}	14 02 07.594
24	Th	2 04 21.44 ^{225.10}	12 37 14.6 ^{1201.2}	15 55.98	8.75	1 42.72 ^{11.45}	14 06 04.152
25	Fr	2 08 06.99 ^{225.55}	12 57 03.4 ^{1188.8}	15 55.73	8.75	1 53.72 ^{11.00}	14 10 00.710
26	Sa	2 11 53.00 ^{226.01}	+13 16 39.3 ^{1175.9}	15 55.48	8.74	+2 04.26 ^{10.54}	14 13 57.267
27	Su	2 15 39.47 ^{226.47}	13 36 02.1 ^{+1162.8}	15 55.24	8.74	2 14.35 ^{+10.09}	14 17 53.823
28	Mo	2 19 26.42 ^{226.95}	13 55 11.4 ^{1149.3}	15 54.99	8.74	2 23.95 ^{9.60}	14 21 50.376
29	Tu	2 23 13.86 ^{227.44}	14 14 06.8 ^{1135.4}	15 54.75	8.74	2 33.06 ^{9.11}	14 25 46.927
30	We	2 27 01.79 ^{227.93}	14 32 48.2 ^{1121.4}	15 54.52	8.74	2 41.68 ^{8.62}	14 29 43.477
May 1	Th	2 30 50.23 ^{228.44}	+14 51 15.1 ^{1106.9}	15 54.28	8.73	+2 49.80 ^{8.12}	14 33 40.026
2	Fr	2 34 39.19 ^{228.96}	15 09 27.2 ^{+1092.1}	15 54.04	8.73	2 57.40 ^{+7.60}	14 37 36.576
3	Sa	2 38 28.68 ^{229.49}	15 27 24.4 ^{1077.2}	15 53.81	8.73	3 04.46 ^{7.06}	14 41 33.129
4	Su	2 42 18.71 ^{230.03}	15 45 06.2 ^{1061.8}	15 53.57	8.73	3 10.98 ^{6.52}	14 45 29.684
5	Mo	2 46 09.30 ^{230.59}	16 02 32.3 ^{1046.1}	15 53.34	8.73	3 16.95 ^{5.97}	14 49 26.242
6	Tu	2 50 00.44 ^{231.14}	+16 19 42.6 ^{1030.3}	15 53.11	8.72	+3 22.36 ^{5.41}	14 53 22.802
7	We	2 53 52.17 ^{231.73}	16 36 36.6 ^{+1014.0}	15 52.87	8.72	3 27.19 ^{+4.83}	14 57 19.362
8	Th	2 57 44.47 ^{232.30}	16 53 14.1 ^{997.5}	15 52.64	8.72	3 31.44 ^{4.25}	15 01 15.922
9	Fr	3 01 37.36 ^{232.89}	17 09 34.8 ^{980.7}	15 52.42	8.72	3 35.11 ^{3.67}	15 05 12.479
10	Sa	3 05 30.84 ^{233.48}	17 25 38.3 ^{963.5}	15 52.19	8.71	3 38.18 ^{3.07}	15 09 09.035
11	Su	3 09 24.91 ^{234.07}	+17 41 24.4 ^{946.1}	15 51.97	8.71	+3 40.67 ^{2.49}	15 13 05.589
12	Mo	3 13 19.57 ^{234.66}	17 56 52.8 ^{+928.4}	15 51.75	8.71	3 42.56 ^{+1.89}	15 17 02.140
13	Tu	3 17 14.82 ^{235.25}	18 12 03.2 ^{910.4}	15 51.53	8.71	3 43.86 ^{1.30}	15 20 58.690
14	We	3 21 10.67 ^{235.85}	18 26 55.2 ^{892.0}	15 51.32	8.71	3 44.58 ^{0.72}	15 24 55.241
15	Th	3 25 07.09 ^{236.42}	18 41 28.7 ^{873.5}	15 51.11	8.70	3 44.70 ^{+0.12}	15 28 51.791
16	Fr	3 29 04.10 ^{237.01}	+18 55 43.2 ^{854.5}	15 50.91	8.70	+3 44.25 ^{-0.45}	15 32 48.342
17	Sa	3 33 01.69 ^{237.59}	+19 09 38.6 ^{+835.4}	15 50.71	8.70	+3 43.22 ^{-1.03}	15 36 44.895

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h
		Mean Equinox of 1950.0		Eclip- tic of 1950.0	Eclip- tic of 1958.0					
		° ' "	"	"	"		"	"	s	h m s
Apr. 1	91	10 39 02.2	3550.5	-1.88	-0.82	0.999 2688	12.41	+9.16	+0.567	11 22 44.395
2	92	11 38 12.7	3548.4	1.86	0.74	0.999 5520	12.54	9.11	0.560	11 18 48.493
3	93	12 37 21.1	3546.2	1.82	0.64	0.999 8367	12.68	9.05	0.552	11 14 52.591
4	94	13 36 27.3	3544.1	1.75	0.51	1.000 1229	12.82	9.00	0.545	11 10 56.689
5	95	14 35 31.4	3542.2	1.67	0.37	1.000 4106	12.96	8.95	0.538	11 07 00.785
6	96	15 34 33.6	3540.4	-1.60	-0.23	1.000 6996	13.09	+8.89	+0.535	11 03 04.878
7	97	16 33 34.0	3538.4	1.52	-0.10	1.000 9897	13.23	8.84	0.534	10 59 08.968
8	98	17 32 32.4	3536.8	1.45	+0.03	1.001 2806	13.37	8.79	0.535	10 55 13.057
9	99	18 31 29.2	3535.0	1.41	0.13	1.001 5720	13.51	8.75	0.538	10 51 17.144
10	100	19 30 24.2	3533.2	1.39	0.21	1.001 8634	13.64	8.70	0.540	10 47 21.233
11	101	20 29 17.4	3531.6	-1.40	+0.25	1.002 1545	13.78	+8.65	+0.541	10 43 25.323
12	102	21 28 09.0	3529.8	1.44	0.27	1.002 4449	13.92	8.60	0.540	10 39 29.415
13	103	22 26 58.8	3528.1	1.50	0.27	1.002 7342	14.06	8.56	0.537	10 35 33.510
14	104	23 25 46.9	3526.3	1.60	0.23	1.003 0221	14.20	8.51	0.532	10 31 37.606
15	105	24 24 33.2	3524.5	1.73	0.15	1.003 3083	14.33	8.47	0.526	10 27 41.704
16	106	25 23 17.7	3522.7	-1.88	+0.06	1.003 5926	14.47	+8.43	+0.519	10 23 45.801
17	107	26 22 00.4	3520.9	2.04	-0.04	1.003 8748	14.61	8.38	0.511	10 19 49.899
18	108	27 20 41.3	3518.9	2.21	0.16	1.004 1547	14.75	8.34	0.504	10 15 53.996
19	109	28 19 20.2	3517.1	2.40	0.30	1.004 4321	14.88	8.31	0.499	10 11 58.092
20	110	29 17 57.3	3515.1	2.59	0.43	1.004 7069	15.02	8.27	0.494	10 08 02.186
21	111	30 16 32.4	3513.1	-2.77	-0.56	1.004 9791	15.16	+8.23	+0.492	10 04 06.278
22	112	31 15 05.5	3511.0	2.95	0.69	1.005 2485	15.30	8.20	0.491	10 00 10.369
23	113	32 13 36.5	3509.0	3.10	0.79	1.005 5152	15.43	8.16	0.492	9 56 14.458
24	114	33 12 05.5	3506.8	3.23	0.87	1.005 7792	15.57	8.13	0.494	9 52 18.546
25	115	34 10 32.3	3504.8	3.33	0.92	1.006 0408	15.71	8.10	0.497	9 48 22.634
26	116	35 08 57.1	3502.6	-3.41	-0.95	1.006 2999	15.85	+8.07	+0.499	9 44 26.723
27	117	36 07 19.7	3500.5	3.45	0.94	1.006 5568	15.98	8.04	0.499	9 40 30.814
28	118	37 05 40.2	3498.3	3.45	0.89	1.006 8118	16.12	8.01	0.497	9 36 34.908
29	119	38 03 58.5	3496.3	3.43	0.82	1.007 0651	16.26	7.99	0.493	9 32 39.003
30	120	39 02 14.8	3494.3	3.37	0.73	1.007 3171	16.40	7.96	0.487	9 28 43.100
May 1	121	40 00 29.1	3492.3	-3.29	-0.60	1.007 5678	16.54	+7.94	+0.481	9 24 47.196
2	122	40 58 41.4	3490.4	3.20	0.46	1.007 8175	16.67	7.92	0.476	9 20 51.291
3	123	41 56 51.8	3488.7	3.10	0.33	1.008 0664	16.81	7.90	0.473	9 16 55.383
4	124	42 55 00.5	3487.0	3.00	0.18	1.008 3145	16.95	7.88	0.473	9 12 59.473
5	125	43 53 07.5	3485.4	2.91	-0.05	1.008 5617	17.09	7.86	0.475	9 09 03.560
6	126	44 51 12.9	3483.9	-2.85	+0.06	1.008 8079	17.22	+7.85	+0.480	9 05 07.646
7	127	45 49 16.8	3482.5	2.80	0.14	1.009 0526	17.36	7.83	0.484	9 01 11.732
8	128	46 47 19.3	3481.1	2.78	0.20	1.009 2955	17.50	7.82	0.489	8 57 15.819
9	129	47 45 20.4	3479.8	2.78	0.24	1.009 5365	17.64	7.81	0.491	8 53 19.907
10	130	48 43 20.2	3478.4	2.82	0.23	1.009 7750	17.77	7.80	0.492	8 49 23.998
11	131	49 41 18.6	3477.2	-2.89	+0.20	1.010 0108	17.91	+7.79	+0.490	8 45 28.092
12	132	50 39 15.8	3475.8	2.98	0.15	1.010 2436	18.05	7.78	0.486	8 41 32.187
13	133	51 37 11.6	3474.6	3.10	+0.07	1.010 4730	18.19	7.77	0.481	8 37 36.282
14	134	52 35 06.2	3473.2	3.24	-0.04	1.010 6987	18.32	7.77	0.476	8 33 40.378
15	135	53 32 59.4	3472.0	3.39	0.16	1.010 9206	18.46	7.77	0.471	8 29 44.473
16	136	54 30 51.4	3470.6	-3.55	-0.28	1.011 1384	18.60	+7.77	+0.467	8 25 48.567
17	137	55 28 42.0	3469.2	-3.70	-0.40	1.011 3518	18.74	+7.77	+0.464	8 21 52.659

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

FOR 0^h UNIVERSAL TIME

Date	Day of the Week	Apparent Right Ascension	Apparent Declination	Semi- diameter	Hor. Par.	Equation of Time App.—Mean	Sidereal Time (Right Ascension of Mean Sun+12 ^h)
		h m s	° ' "	' "	"	m s	h m s
May	17	Sa 3 33 01.69 238.16	+19 09 38.6	15 50.71	8.70	+3 43.22	15 36 44.895
	18	Su 3 36 59.85 238.71	19 23 14.5	15 50.51	8.70	3 41.62	15 40 41.450
	19	Mo 3 40 58.56 239.28	19 36 30.8	15 50.32	8.70	3 39.45	15 44 38.007
	20	Tu 3 44 57.84 239.81	19 49 27.0	15 50.13	8.70	3 36.74	15 48 34.565
	21	We 3 48 57.65 240.34	20 02 02.9	15 49.95	8.69	3 33.48	15 52 31.125
	22	Th 3 52 57.99 240.87	+20 14 18.3	15 49.77	8.69	+3 29.69	15 56 27.685
	23	Fr 3 56 58.86 241.37	20 26 13.0	15 49.60	8.69	3 25.38	16 00 24.244
	24	Sa 4 01 00.23 241.87	20 37 46.6	15 49.43	8.69	3 20.57	16 04 20.803
	25	Su 4 05 02.10 242.35	20 48 58.9	15 49.26	8.69	3 15.25	16 08 17.359
	26	Mo 4 09 04.45 242.82	20 59 49.8	15 49.10	8.69	3 09.46	16 12 13.913
	27	Tu 4 13 07.27 243.28	+21 10 18.9	15 48.94	8.69	+3 03.19	16 16 10.465
	28	We 4 17 10.55 243.73	21 20 26.0	15 48.79	8.68	2 56.47	16 20 07.016
	29	Th 4 21 14.28 244.17	21 30 11.1	15 48.64	8.68	2 49.30	16 24 03.568
	30	Fr 4 25 18.45 244.59	21 39 33.7	15 48.49	8.68	2 41.69	16 28 00.121
	31	Sa 4 29 23.04 245.01	21 48 33.8	15 48.34	8.68	2 33.65	16 31 56.678
June	1	Su 4 33 28.05 245.41	+21 57 11.1	15 48.20	8.68	+2 25.20	16 35 53.237
	2	Mo 4 37 33.46 245.81	22 05 25.6	15 48.06	8.68	2 16.34	16 39 49.798
	3	Tu 4 41 39.27 246.20	22 13 16.9	15 47.92	8.68	2 07.09	16 43 46.360
	4	We 4 45 45.47 246.56	22 20 45.0	15 47.78	8.67	1 57.45	16 47 42.922
	5	Th 4 49 52.03 246.92	22 27 49.7	15 47.65	8.67	1 47.44	16 51 39.482
	6	Fr 4 53 58.95 247.26	+22 34 30.8	15 47.52	8.67	+1 37.08	16 55 36.041
	7	Sa 4 58 06.21 247.58	22 40 48.2	15 47.39	8.67	1 26.38	16 59 32.597
	8	Su 5 02 13.79 247.88	22 46 41.7	15 47.27	8.67	1 15.35	17 03 29.151
	9	Mo 5 06 21.67 248.17	22 52 11.3	15 47.15	8.67	1 04.03	17 07 25.704
	10	Tu 5 10 29.84 248.42	22 57 16.7	15 47.04	8.67	0 52.42	17 11 22.256
	11	We 5 14 38.26 248.67	+23 01 58.0	15 46.92	8.67	+0 40.55	17 15 18.807
	12	Th 5 18 46.93 248.88	23 06 14.9	15 46.82	8.67	0 28.44	17 19 15.360
	13	Fr 5 22 55.81 249.07	23 10 07.5	15 46.72	8.66	0 16.11	17 23 11.914
	14	Sa 5 27 04.88 249.25	23 13 35.5	15 46.62	8.66	+0 03.60	17 27 08.469
	15	Su 5 31 14.13 249.38	23 16 38.9	15 46.53	8.66	-0.09.09	17 31 05.027
	16	Mo 5 35 23.51 249.50	+23 19 17.8	15 46.44	8.66	-0 21.91	17 35 01.586
	17	Tu 5 39 33.01 249.58	23 21 32.0	15 46.36	8.66	0 34.85	17 38 58.147
	18	We 5 43 42.59 249.65	23 23 21.4	15 46.28	8.66	0 47.88	17 42 54.709
	19	Th 5 47 52.24 249.67	23 24 46.1	15 46.21	8.66	1 00.97	17 46 51.270
	20	Fr 5 52 01.91 249.68	23 25 46.0	15 46.15	8.66	1 14.09	17 50 47.830
	21	Sa 5 56 11.59 249.66	+23 26 21.2	15 46.09	8.66	-1 27.21	17 54 44.388
	22	Su 6 00 21.25 249.60	23 26 31.5	15 46.04	8.66	1 40.31	17 58 40.943
	23	Mo 6 04 30.85 249.53	23 26 17.1	15 45.99	8.66	1 53.36	18 02 37.496
	24	Tu 6 08 40.38 249.43	23 25 37.9	15 45.94	8.66	2 06.33	18 06 34.049
	25	We 6 12 49.81 249.30	23 24 34.0	15 45.90	8.66	2 19.20	18 10 30.601
	26	Th 6 16 59.11 249.15	+23 23 05.3	15 45.87	8.66	-2 31.94	18 14 27.154
	27	Fr 6 21 08.26 248.99	23 21 12.0	15 45.84	8.66	2 44.54	18 18 23.710
	28	Sa 6 25 17.25 248.79	23 18 54.1	15 45.81	8.66	2 56.97	18 22 20.268
	29	Su 6 29 26.04 248.59	23 16 11.6	15 45.79	8.66	3 09.21	18 26 16.829
	30	Mo 6 33 34.63 248.37	23 13 04.7	15 45.77	8.66	3 21.24	18 30 13.391
July	1	Tu 6 37 43.00 248.13	+23 09 33.3	15 45.75	8.66	-3 33.05	18 34 09.953
	2	We 6 41 51.13	+23 05 37.6	15 45.73	8.66	-3 44.63	18 38 06.515

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h
		Mean Equinox of 1950.0		Eclip- tic of 1950.0	Eclip- tic of 1958.0					
		° ' "	"	"	"		"	"	s	h m s
May 17	137	55 28 42.0	3469.3	-3.70	-0.40	1.011 3518	18.74	+7.77	+0.464	8 21 52.659
18	138	56 26 31.3	3467.9	3.85	0.53	1.011 5608	18.87	7.77	0.464	8 17 56.750
19	139	57 24 19.2	3466.5	4.00	0.65	1.011 7652	19.01	7.77	0.465	8 14 00.839
20	140	58 22 05.7	3465.1	4.14	0.75	1.011 9648	19.15	7.77	0.468	8 10 04.926
21	141	59 19 50.8	3463.6	4.25	0.84	1.012 1597	19.29	7.78	0.472	8 06 09.012
22	142	60 17 34.4	3462.2	-4.34	-0.91	1.012 3498	19.43	+7.78	+0.477	8 02 13.098
23	143	61 15 16.6	3460.6	4.40	0.94	1.012 5352	19.56	7.79	0.481	7 58 17.184
24	144	62 12 57.2	3459.1	4.42	0.93	1.012 7160	19.70	7.80	0.484	7 54 21.272
25	145	63 10 36.3	3457.6	4.41	0.90	1.012 8925	19.84	7.81	0.485	7 50 25.363
26	146	64 08 13.9	3456.0	4.37	0.83	1.013 0648	19.98	7.82	0.483	7 46 29.456
27	147	65 05 49.9	3454.6	-4.30	-0.75	1.013 2333	20.11	+7.83	+0.480	7 42 33.550
28	148	66 03 24.5	3453.1	4.20	0.63	1.013 3982	20.25	7.84	0.476	7 38 37.644
29	149	67 00 57.6	3451.7	4.10	0.50	1.013 5599	20.39	7.85	0.472	7 34 41.738
30	150	67 58 29.3	3450.5	3.98	0.36	1.013 7185	20.53	7.86	0.470	7 30 45.830
31	151	68 55 59.8	3449.2	3.86	0.23	1.013 8744	20.66	7.88	0.471	7 26 49.919
June 1	152	69 53 29.0	3448.1	-3.74	-0.10	1.014 0276	20.80	+7.90	+0.475	7 22 54.005
2	153	70 50 57.1	3447.1	3.64	+0.02	1.014 1783	20.94	7.92	0.481	7 18 58.089
3	154	71 48 24.2	3446.2	3.56	0.12	1.014 3264	21.08	7.93	0.487	7 15 02.173
4	155	72 45 50.4	3445.4	3.50	0.19	1.014 4718	21.21	7.95	0.494	7 11 06.257
5	156	73 43 15.8	3444.6	3.48	0.22	1.014 6143	21.35	7.97	0.499	7 07 10.343
6	157	74 40 40.4	3444.0	-3.48	+0.23	1.014 7537	21.49	+7.99	+0.503	7 03 14.431
7	158	75 38 04.4	3443.3	3.50	0.22	1.014 8897	21.63	8.01	0.503	6 59 18.521
8	159	76 35 27.7	3442.8	3.55	0.18	1.015 0218	21.77	8.03	0.502	6 55 22.614
9	160	77 32 50.5	3442.2	3.63	0.11	1.015 1500	21.90	8.05	0.499	6 51 26.707
10	161	78 30 12.7	3441.6	3.73	+0.01	1.015 2738	22.04	8.07	0.496	6 47 30.802
11	162	79 27 34.3	3441.2	-3.85	-0.10	1.015 3930	22.18	+8.10	+0.492	6 43 34.896
12	163	80 24 55.5	3440.7	3.97	0.21	1.015 5074	22.32	8.12	0.489	6 39 38.989
13	164	81 22 16.2	3440.1	4.09	0.33	1.015 6168	22.45	8.14	0.488	6 35 43.080
14	165	82 19 36.3	3439.7	4.21	0.45	1.015 7209	22.59	8.17	0.488	6 31 47.170
15	166	83 16 56.0	3439.2	4.33	0.56	1.015 8195	22.73	8.19	0.490	6 27 51.258
16	167	84 14 15.2	3438.7	-4.44	-0.67	1.015 9124	22.87	+8.22	+0.494	6 23 55.344
17	168	85 11 33.9	3438.1	4.52	0.75	1.015 9995	23.00	8.24	0.500	6 19 59.429
18	169	86 08 52.0	3437.5	4.58	0.82	1.016 0806	23.14	8.27	0.506	6 16 03.513
19	170	87 06 09.5	3436.9	4.61	0.85	1.016 1558	23.28	8.29	0.512	6 12 07.598
20	171	88 03 26.4	3436.3	4.62	0.86	1.016 2249	23.42	8.32	0.516	6 08 11.685
21	172	89 00 42.7	3435.6	-4.58	-0.83	1.016 2882	23.55	+8.34	+0.519	6 04 15.773
22	173	89 57 58.3	3435.0	4.52	0.77	1.016 3459	23.69	8.37	0.519	6 00 19.864
23	174	90 55 13.3	3434.3	4.43	0.69	1.016 3981	23.83	8.39	0.517	5 56 23.957
24	175	91 52 27.6	3433.6	4.32	0.58	1.016 4451	23.97	8.42	0.514	5 52 28.051
25	176	92 49 41.2	3433.0	4.18	0.45	1.016 4872	24.10	8.44	0.511	5 48 32.144
26	177	93 46 54.2	3432.4	-4.03	-0.31	1.016 5248	24.24	+8.47	+0.509	5 44 36.236
27	178	94 44 06.6	3431.9	3.88	0.18	1.016 5583	24.38	8.49	0.509	5 40 40.326
28	179	95 41 18.5	3431.5	3.74	-0.05	1.016 5878	24.52	8.52	0.512	5 36 44.413
29	180	96 38 30.0	3431.2	3.61	+0.07	1.016 6137	24.66	8.54	0.517	5 32 48.498
30	181	97 35 41.2	3430.9	3.49	0.17	1.016 6361	24.79	8.57	0.524	5 28 52.581
July 1	182	98 32 52.1	3430.7	-3.41	+0.24	1.016 6551	24.93	+8.59	+0.531	5 24 56.665
2	183	99 30 02.8		-3.34	+0.29	1.016 6709	25.07	+8.61	+0.537	5 21 00.750

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

FOR 0^h UNIVERSAL TIME

Date	Day of the Week	Apparent Right Ascension		Apparent Declination		Semi- diameter	Hor. Par.	Equation of Time App.—Mean		Sidereal Time (Right Ascen- sion of Mean Sun + 12 ^h)
		h	m s	° ' "	"	' "	"	m s	s	h m s
July	1 Tu	6 37 43.00	248.13	+23 09 33.3	- 235.7	15 45.75	8.66	-3 33.05	-11.58	18 34 09.953
	2 We	6 41 51.13	247.87	23 05 37.6	260.0	15 45.73	8.66	3 44.63	11.31	18 38 06.515
	3 Th	6 45 59.00	247.60	23 01 17.6	284.1	15 45.72	8.66	3 55.94	11.04	18 42 03.074
	4 Fr	6 50 06.60	247.31	22 56 33.5	308.0	15 45.71	8.66	4 06.98	10.75	18 45 59.631
	5 Sa	6 54 13.91	246.99	22 51 25.5	332.0	15 45.71	8.66	4 17.73	10.44	18 49 56.186
	6 Su	6 58 20.90	246.67	+22 45 53.5	- 355.7	15 45.71	8.66	-4 28.17	-10.11	18 53 52.739
	7 Mo	7 02 27.57	246.33	22 39 57.8	379.4	15 45.71	8.66	4 38.28	9.77	18 57 49.291
	8 Tu	7 06 33.90	245.96	22 33 38.4	402.8	15 45.72	8.66	4 48.05	9.41	19 01 45.843
	9 We	7 10 39.86	245.58	22 26 55.6	426.1	15 45.73	8.66	4 57.46	9.03	19 05 42.395
	10 Th	7 14 45.44	245.19	22 19 49.5	449.3	15 45.74	8.66	5 06.49	8.62	19 09 38.948
	11 Fr	7 18 50.63	244.77	+22 12 20.2	- 472.2	15 45.76	8.66	-5 15.11	- 8.22	19 13 35.503
	12 Sa	7 22 55.40	244.34	22 04 28.0	495.0	15 45.79	8.66	5 23.33	7.78	19 17 32.059
	13 Su	7 26 59.74	243.89	21 56 13.0	517.5	15 45.82	8.66	5 31.11	7.33	19 21 28.617
	14 Mo	7 31 03.63	243.42	21 47 35.5	540.0	15 45.85	8.66	5 38.44	6.87	19 25 25.177
	15 Tu	7 35 07.05	242.94	21 38 35.5	562.1	15 45.89	8.66	5 45.31	6.38	19 29 21.738
	16 We	7 39 09.99	242.43	+21 29 13.4	- 584.0	15 45.94	8.66	-5 51.69	- 5.88	19 33 18.299
	17 Th	7 43 12.42	241.92	21 19 29.4	605.8	15 45.99	8.66	5 57.57	5.36	19 37 14.859
	18 Fr	7 47 14.34	241.38	21 09 23.6	627.2	15 46.05	8.66	6 02.93	4.83	19 41 11.417
	19 Sa	7 51 15.72	240.84	20 58 56.4	648.5	15 46.11	8.66	6 07.76	4.28	19 45 07.972
	20 Su	7 55 16.56	240.27	20 48 07.9	669.4	15 46.18	8.66	6 12.04	3.71	19 49 04.525
	21 Mo	7 59 16.83	239.69	+20 36 58.5	- 690.2	15 46.26	8.66	-6 15.75	- 3.14	19 53 01.077
	22 Tu	8 03 16.52	239.10	20 25 28.3	710.6	15 46.33	8.66	6 18.89	2.55	19 56 57.628
	23 We	8 07 15.62	238.52	20 13 37.7	730.9	15 46.42	8.66	6 21.44	1.95	20 00 54.179
	24 Th	8 11 14.14	237.90	20 01 26.8	750.9	15 46.51	8.66	6 23.39	1.35	20 04 50.733
	25 Fr	8 15 12.04	237.30	19 48 55.9	770.6	15 46.60	8.66	6 24.74	0.75	20 08 47.289
	26 Sa	8 19 09.34	236.69	+19 36 05.3	- 790.1	15 46.70	8.66	-6 25.49	- 0.13	20 12 43.847
	27 Su	8 23 06.03	236.08	19 22 55.2	809.3	15 46.80	8.67	6 25.62	+ 0.48	20 16 40.408
	28 Mo	8 27 02.11	235.46	19 09 25.9	828.2	15 46.90	8.67	6 25.14	1.09	20 20 36.968
	29 Tu	8 30 57.57	234.86	18 55 37.7	847.0	15 47.01	8.67	6 24.05	1.70	20 24 33.528
	30 We	8 34 52.43	234.24	18 41 30.7	865.4	15 47.12	8.67	6 22.35	2.31	20 28 30.086
Aug.	31 Th	8 38 46.67	233.65	+18 27 05.3	- 883.5	15 47.23	8.67	-6 20.04	+ 2.91	20 32 26.643
	1 Fr	8 42 40.32	233.03	18 12 21.8	901.5	15 47.34	8.67	6 17.13	3.52	20 36 23.196
	2 Sa	8 46 33.35	232.45	17 57 20.3	919.0	15 47.46	8.67	6 13.61	4.11	20 40 19.748
	3 Su	8 50 25.80	231.85	17 42 01.3	936.4	15 47.58	8.67	6 09.50	4.70	20 44 16.299
	4 Mo	8 54 17.65	231.26	17 26 24.9	953.5	15 47.71	8.67	6 04.80	5.30	20 48 12.849
	5 Tu	8 58 08.91	230.67	+17 10 31.4	- 970.2	15 47.83	8.67	-5 59.50	+ 5.88	20 52 09.399
	6 We	9 01 59.58	230.09	16 54 21.2	986.7	15 47.96	8.68	5 53.62	6.46	20 56 05.950
	7 Th	9 05 49.67	229.52	16 37 54.5	1002.8	15 48.10	8.68	5 47.16	7.04	21 00 02.502
	8 Fr	9 09 39.19	228.94	16 21 11.7	1018.7	15 48.23	8.68	5 40.12	7.61	21 03 59.055
	9 Sa	9 13 28.13	228.38	16 04 13.0	1034.2	15 48.38	8.68	5 32.51	8.18	21 07 55.611
	10 Su	9 17 16.51	227.82	+15 46 58.8	-1049.5	15 48.52	8.68	-5 24.33	+ 8.74	21 11 52.168
	11 Mo	9 21 04.33	227.26	15 29 29.3	1064.5	15 48.67	8.68	5 15.59	9.29	21 15 48.726
	12 Tu	9 24 51.59	226.71	15 11 44.8	1079.0	15 48.83	8.68	5 06.30	9.84	21 19 45.285
	13 We	9 28 38.30	226.16	14 53 45.8	1093.3	15 48.99	8.69	4 56.46	10.39	21 23 41.844
	14 Th	9 32 24.46	225.63	14 35 32.5	1107.3	15 49.15	8.69	4 46.07	10.93	21 27 38.400
	15 Fr	9 36 10.09	225.08	+14 17 05.2	-1120.9	15 49.32	8.69	-4 35.14	+11.47	21 31 34.954
	16 Sa	9 39 55.17		+13 58 24.3		15 49.49	8.69	-4 23.67		21 35 31.507

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h
		Mean Equinox of 1950.0		Ecliptic of 1950.0	Ecliptic of 1958.0					
		" ' "	" "	" "	" "		"	"	s	h m s
July 1	182	98 32 52.1	3430.7	-3.41	+0.24	1.016 6551	24.93	+8.59	+0.531	5 24 56.665
2	183	99 30 02.8	3430.7	3.34	0.29	1.016 6709 + 158	25.07	8.61	0.537	5 21 00.750
3	184	100 27 13.5	3430.8	3.31	0.30	1.016 6833 124	25.21	8.64	0.541	5 17 04.837
4	185	101 24 24.3	3430.9	3.32	0.28	1.016 6922 89	25.34	8.66	0.543	5 13 08.926
5	186	102 21 35.2	3431.1	3.34	0.24	1.016 6974 52	25.48	8.68	0.542	5 09 13.018
6	187	103 18 46.3	3431.4	-3.39	+0.17	1.016 6987 + 13	25.62	+8.70	+0.540	5 05 17.111
7	188	104 15 57.7	3431.7	3.46	+0.08	1.016 6960 - 27	25.76	8.72	0.537	5 01 21.205
8	189	105 13 09.4	3432.1	3.53	-0.02	1.016 6889 71	25.89	8.74	0.533	4 57 25.299
9	190	106 10 21.5	3432.4	3.62	0.13	1.016 6772 117	26.03	8.76	0.530	4 53 29.393
10	191	107 07 33.9	3432.9	3.71	0.24	1.016 6608 164	26.17	8.78	0.527	4 49 33.485
11	192	108 04 46.8	3433.3	-3.80	-0.36	1.016 6393 215	26.31	+8.80	+0.526	4 45 37.576
12	193	109 02 00.1	3433.7	3.90	0.47	1.016 6127 - 266	26.44	8.81	0.527	4 41 41.666
13	194	109 59 13.8	3434.3	3.97	0.57	1.016 5806 321	26.58	8.83	0.530	4 37 45.753
14	195	110 56 28.1	3434.7	4.02	0.65	1.016 5428 378	26.72	8.85	0.535	4 33 49.839
15	196	111 53 42.8	3435.1	4.05	0.71	1.016 4993 435	26.86	8.86	0.540	4 29 53.924
16	197	112 50 57.9	3435.5	-4.06	-0.75	1.016 4497 496	27.00	+8.87	+0.546	4 25 58.009
17	198	113 48 13.4	3436.0	4.04	0.76	1.016 3940 - 557	27.13	8.88	0.550	4 22 02.095
18	199	114 45 29.4	3436.2	3.98	0.73	1.016 3321 619	27.27	8.90	0.553	4 18 06.184
19	200	115 42 45.6	3436.6	3.90	0.68	1.016 2641 680	27.41	8.90	0.553	4 14 10.275
20	201	116 40 02.2	3436.8	3.78	0.60	1.016 1901 740	27.55	8.91	0.551	4 10 14.368
21	202	117 37 19.0	3437.1	-3.65	-0.50	1.016 1103 798	27.68	+8.92	+0.547	4 06 18.462
22	203	118 34 36.1	3437.4	3.48	0.37	1.016 0251 - 852	27.82	8.93	0.542	4 02 22.557
23	204	119 31 53.5	3437.6	3.31	0.23	1.015 9348 903	27.96	8.94	0.539	3 58 26.651
24	205	120 29 11.1	3438.0	3.13	-0.09	1.015 8397 951	28.10	8.94	0.537	3 54 30.743
25	206	121 26 29.1	3438.2	2.97	+0.04	1.015 7402 995	28.23	8.94	0.538	3 50 34.832
26	207	122 23 47.3	3438.8	-2.81	+0.16	1.015 6365 1037	28.37	+8.94	+0.541	3 46 38.919
27	208	123 21 06.1	3439.2	2.67	0.26	1.015 5292 -1073	28.51	8.94	0.546	3 42 43.005
28	209	124 18 25.3	3439.7	2.55	0.33	1.015 4183 1109	28.65	8.94	0.551	3 38 47.090
29	210	125 15 45.0	3440.4	2.46	0.39	1.015 3042 1141	28.78	8.94	0.555	3 34 51.177
30	211	126 13 05.4	3441.2	2.41	0.40	1.015 1871 1171	28.92	8.94	0.558	3 30 55.264
31	212	127 10 26.6	3442.1	-2.37	+0.39	1.015 0669 1202	29.06	+8.94	+0.559	3 26 59.354
Aug. 1	213	128 07 48.7	3442.9	2.37	0.35	1.014 9437 -1232	29.20	8.93	0.558	3 23 03.447
2	214	129 05 11.6	3444.0	2.39	0.28	1.014 8175 1262	29.33	8.92	0.554	3 19 07.541
3	215	130 02 35.6	3445.0	2.43	0.20	1.014 6881 1294	29.47	8.91	0.550	3 15 11.636
4	216	131 00 00.6	3446.2	2.49	+0.10	1.014 5555 1326	29.61	8.90	0.544	3 11 15.732
5	217	131 57 26.8	3447.4	-2.55	-0.01	1.014 4195 1360	29.75	+8.89	+0.539	3 07 19.828
6	218	132 54 54.2	3448.7	2.62	0.13	1.014 2799 -1396	29.89	8.88	0.534	3 03 23.923
7	219	133 52 22.9	3449.9	2.69	0.24	1.014 1366 1433	30.02	8.87	0.531	2 59 28.017
8	220	134 49 52.8	3451.2	2.75	0.35	1.013 9893 1473	30.16	8.85	0.529	2 55 32.109
9	221	135 47 24.0	3452.6	2.81	0.46	1.013 8380 1513	30.30	8.83	0.529	2 51 36.199
10	222	136 44 56.6	3454.0	-2.84	-0.54	1.013 6823 1557	30.44	+8.81	+0.531	2 47 40.288
11	223	137 42 30.6	3455.3	2.86	0.61	1.013 5222 -1601	30.57	8.79	0.534	2 43 44.375
12	224	138 40 05.9	3456.7	2.85	0.65	1.013 3573 1649	30.71	8.77	0.537	2 39 48.462
13	225	139 37 42.6	3458.0	2.80	0.65	1.013 1875 1698	30.85	8.75	0.541	2 35 52.550
14	226	140 35 20.6	3459.3	2.73	0.63	1.013 0125 1750	30.99	8.73	0.542	2 31 56.639
15	227	141 32 59.9	3460.6	-2.63	-0.59	1.012 8323 1802	31.12	+8.70	+0.541	2 28 00.731
16	228	142 30 40.5		-2.49	-0.50	1.012 6469 -1854	31.26	+8.68	+0.537	2 24 04.825

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

FOR 0^h UNIVERSAL TIME

Date	Day of the Week	Apparent Right Ascension	Apparent Declination	Semi-diameter	Hor. Par.	Equation of Time App.—Mean	Sidereal Time (Right Ascension of Mean Sun+12 ^h)
		h m s	° ' "	' "	"	m s	h m s
Aug. 16	Sa	9 39 55.17 ^s	+13 58 24.3	15 49.49	8.69	- 4 23.67 ^s	21 35 31.507
17	Su	9 43 39.72 ^s	13 39 30.1	15 49.67	8.69	4 11.67 ^s	21 39 28.056
18	Mo	9 47 23.75 ^s	13 20 23.0	15 49.85	8.69	3 59.14 ^s	21 43 24.605
19	Tu	9 51 07.26 ^s	13 01 03.2	15 50.04	8.70	3 46.10 ^s	21 47 21.154
20	We	9 54 50.25 ^s	12 41 31.1	15 50.23	8.70	3 32.54 ^s	21 51 17.705
21	Th	9 58 32.74 ^s	+12 21 47.1	15 50.43	8.70	- 3 18.47 ^s	21 55 14.259
22	Fr	10 02 14.74 ^s	12 01 51.4	15 50.63	8.70	3 03.92 ^s	21 59 10.814
23	Sa	10 05 56.26 ^s	11 41 44.4	15 50.83	8.70	2 48.88 ^s	22 03 07.372
24	Su	10 09 37.31 ^s	11 21 26.3	15 51.04	8.70	2 33.38 ^s	22 07 03.930
25	Mo	10 13 17.91 ^s	11 00 57.5	15 51.25	8.71	2 17.43 ^s	22 11 00.488
26	Tu	10 16 58.08 ^s	+10 40 18.3	15 51.46	8.71	- 2 01.05 ^s	22 14 57.044
27	We	10 20 37.83 ^s	10 19 29.0	15 51.67	8.71	1 44.24 ^s	22 18 53.599
28	Th	10 24 17.19 ^s	9 58 29.9	15 51.89	8.71	1 27.05 ^s	22 22 50.151
29	Fr	10 27 56.16 ^s	9 37 21.2	15 52.10	8.71	1 09.47 ^s	22 26 46.701
30	Sa	10 31 34.78 ^s	9 16 03.4	15 52.32	8.72	0 51.53 ^s	22 30 43.250
31	Su	10 35 13.05 ^s	+ 8 54 36.7	15 52.54	8.72	- 0 33.26 ^s	22 34 39.798
Sept. 1	Mo	10 38 51.01 ^s	8 33 01.3	15 52.76	8.72	- 0 14.66 ^s	22 38 36.346
2	Tu	10 42 28.66 ^s	8 11 17.8	15 52.98	8.72	+ 0 04.24 ^s	22 42 32.894
3	We	10 46 06.03 ^s	7 49 26.2	15 53.21	8.72	0 23.42 ^s	22 46 29.443
4	Th	10 49 43.14 ^s	7 27 27.0	15 53.43	8.73	0 42.87 ^s	22 50 25.994
5	Fr	10 53 20.00 ^s	+ 7 05 20.5	15 53.66	8.73	+ 1 02.56 ^s	22 54 22.547
6	Sa	10 56 56.64 ^s	6 43 06.9	15 53.89	8.73	1 22.47 ^s	22 58 19.101
7	Su	11 00 33.07 ^s	6 20 46.7	15 54.13	8.73	1 42.59 ^s	23 02 15.657
8	Mo	11 04 09.32 ^s	5 58 20.0	15 54.36	8.73	2 02.90 ^s	23 06 12.214
9	Tu	11 07 45.40 ^s	5 35 47.4	15 54.60	8.74	2 23.37 ^s	23 10 08.770
10	We	11 11 21.32 ^s	+ 5 13 09.0	15 54.84	8.74	+ 2 44.00 ^s	23 14 05.325
11	Th	11 14 57.11 ^s	4 50 25.3	15 55.08	8.74	3 04.76 ^s	23 18 01.879
12	Fr	11 18 32.79 ^s	4 27 36.6	15 55.33	8.74	3 25.63 ^s	23 21 58.430
13	Sa	11 22 08.36 ^s	4 04 43.2	15 55.58	8.75	3 46.62 ^s	23 25 54.979
14	Su	11 25 43.84 ^s	3 41 45.4	15 55.83	8.75	4 07.69 ^s	23 29 51.526
15	Mo	11 29 19.25 ^s	+ 3 18 43.7	15 56.09	8.75	+ 4 28.83 ^s	23 33 48.073
16	Tu	11 32 54.60 ^s	2 55 38.5	15 56.35	8.75	4 50.03 ^s	23 37 44.622
17	We	11 36 29.91 ^s	2 32 29.9	15 56.61	8.76	5 11.27 ^s	23 41 41.173
18	Th	11 40 05.19 ^s	2 09 18.4	15 56.88	8.76	5 32.54 ^s	23 45 37.727
19	Fr	11 43 40.46 ^s	1 46 04.4	15 57.15	8.76	5 53.83 ^s	23 49 34.283
20	Sa	11 47 15.74 ^s	+ 1 22 48.1	15 57.42	8.76	+ 6 15.10 ^s	23 53 30.840
21	Su	11 50 51.05 ^s	0 59 30.0	15 57.69	8.77	6 36.34 ^s	23 57 27.397
22	Mo	11 54 26.41 ^s	0 36 10.3	15 57.96	8.77	6 57.53 ^s	0 01 23.954
23	Tu	11 58 01.84 ^s	+ 0 12 49.3	15 58.23	8.77	7 18.65 ^s	0 05 20.507
24	We	12 01 37.37 ^s	- 0 10 32.5	15 58.51	8.77	7 39.68 ^s	0 09 17.059
25	Th	12 05 13.01 ^s	- 0 33 55.0	15 58.78	8.78	+ 8 00.59 ^s	0 13 13.608
26	Fr	12 08 48.79 ^s	0 57 17.7	15 59.05	8.78	8 21.36 ^s	0 17 10.156
27	Sa	12 12 24.74 ^s	1 20 40.3	15 59.33	8.78	8 41.96 ^s	0 21 06.703
28	Su	12 16 00.88 ^s	1 44 02.5	15 59.60	8.78	9 02.37 ^s	0 25 03.250
29	Mo	12 19 37.23 ^s	2 07 24.0	15 59.87	8.79	9 22.57 ^s	0 28 59.798
30	Tu	12 23 13.82 ^s	- 2 30 44.4	16 00.15	8.79	+ 9 42.54 ^s	0 32 56.347
Oct. 1	We	12 26 50.66 ^s	- 2 54 03.4	16 00.42	8.79	+10 02.25 ^s	0 36 52.897

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal ^{0b}	
		Mean Equinox of 1950.0		Ecliptic of 1950.0	Ecliptic of 1958.0						
		°	' "	"	"		"	"	s	h m s	
Aug. 16	228	142 30 40.5		-2.49	-0.50	1.012 6469		31.26	+8.68	+0.537	2 24 04.825
17	229	143 28 22.3	3461.8	2.33	0.39	1.012 4563	-1906	31.40	8.65	0.532	2 20 08.922
18	230	144 26 05.3	3463.0	2.15	0.27	1.012 2606	1957	31.54	8.62	0.525	2 16 13.019
19	231	145 23 49.4	3464.1	1.96	-0.13	1.012 0601	2005	31.67	8.59	0.519	2 12 17.115
20	232	146 21 34.6	3465.2	1.76	+0.01	1.011 8552	2049	31.81	8.56	0.515	2 08 21.210
			3466.3				2090				
21	233	147 19 20.9		-1.56	+0.15	1.011 6462		31.95	+8.52	+0.513	2 04 25.302
22	234	148 17 08.2	3467.3	1.37	0.29	1.011 4335	-2127	32.09	8.49	0.513	2 00 29.392
23	235	149 14 56.7	3468.5	1.21	0.39	1.011 2176	2159	32.23	8.45	0.515	1 56 33.481
24	236	150 12 46.4	3469.7	1.07	0.47	1.010 9987	2189	32.36	8.42	0.518	1 52 37.568
25	237	151 10 37.2	3470.8	0.94	0.54	1.010 7772	2215	32.50	8.38	0.520	1 48 41.656
			3472.1				2237				
26	238	152 08 29.3		-0.86	+0.56	1.010 5535		32.64	+8.34	+0.522	1 44 45.746
27	239	153 06 22.8	3473.5	0.82	0.55	1.010 3277	-2258	32.78	8.30	0.521	1 40 49.838
28	240	154 04 17.6	3474.8	0.79	0.51	1.010 1001	2276	32.91	8.26	0.517	1 36 53.932
29	241	155 02 14.0	3476.4	0.79	0.46	1.009 8707	2294	33.05	8.21	0.512	1 32 58.027
30	242	156 00 11.9	3477.9	0.81	0.38	1.009 6398	2309	33.19	8.17	0.505	1 29 02.125
			3479.6				2326				
31	243	156 58 11.5		-0.85	+0.28	1.009 4072		33.33	+8.12	+0.498	1 25 06.223
Sept. 1	244	157 56 12.8	3481.3	0.90	0.16	1.009 1731	-2341	33.46	8.08	0.491	1 21 10.320
2	245	158 54 15.9	3483.1	0.96	+0.05	1.008 9373	2358	33.60	8.03	0.484	1 17 14.418
3	246	159 52 20.8	3484.9	1.02	-0.08	1.008 6997	2376	33.74	7.98	0.478	1 13 18.514
4	247	160 50 27.6	3486.8	1.07	0.19	1.008 4602	2395	33.88	7.93	0.473	1 09 22.609
			3488.7				2415				
5	248	161 48 36.3		-1.11	-0.29	1.008 2187		34.01	+7.88	+0.470	1 05 26.703
6	249	162 46 47.0	3490.7	1.13	0.37	1.007 9752	-2435	34.15	7.83	0.469	1 01 30.794
7	250	163 44 59.7	3492.7	1.14	0.45	1.007 7295	2457	34.29	7.78	0.469	0 57 34.884
8	251	164 43 14.4	3494.7	1.13	0.50	1.007 4813	2482	34.43	7.73	0.471	0 53 38.973
9	252	165 41 31.2	3496.8	1.08	0.51	1.007 2304	2509	34.56	7.67	0.472	0 49 43.063
			3498.8				2537				
10	253	166 39 50.0		-0.99	-0.48	1.006 9767		34.70	+7.62	+0.472	0 45 47.153
11	254	167 38 10.9	3500.9	0.88	0.44	1.006 7199	-2568	34.84	7.56	0.470	0 41 51.246
12	255	168 36 33.7	3502.8	0.74	0.36	1.006 4598	2601	34.98	7.51	0.466	0 37 55.341
13	256	169 34 58.6	3504.9	0.57	0.26	1.006 1963	2635	35.12	7.45	0.459	0 33 59.438
14	257	170 33 25.3	3506.7	0.38	-0.13	1.005 9294	2669	35.25	7.40	0.451	0 30 03.536
			3508.5				2703				
15	258	171 31 53.8		-0.17	+0.01	1.005 6591		35.39	+7.34	+0.443	0 26 07.635
16	259	172 30 24.1	3510.3	+0.04	0.16	1.005 3856	-2735	35.53	7.28	0.437	0 22 11.732
17	260	173 28 56.1	3512.0	0.25	0.30	1.005 1091	2765	35.67	7.23	0.433	0 18 15.826
18	261	174 27 29.8	3513.7	0.45	0.44	1.004 8301	2790	35.80	7.17	0.431	0 14 19.919
19	262	175 26 05.1	3515.3	0.63	0.56	1.004 5488	2813	35.94	7.11	0.432	0 10 24.009
			3516.9				2831				
20	263	176 24 42.0		+0.79	+0.65	1.004 2657		36.08	+7.05	+0.433	0 06 28.097
21	264	177 23 20.6	3518.6	0.92	0.72	1.003 9813	-2844	36.22	6.99	0.435	{ 0 02 32.186 23 55 36.276
22	265	178 22 00.8	3520.2	1.02	0.75	1.003 6959	2854	36.35	6.93	0.436	23 54 40.368
23	266	179 20 42.7	3521.9	1.08	0.75	1.003 4099	2860	36.49	6.87	0.434	23 50 44.462
24	267	180 19 26.4	3523.7	1.11	0.72	1.003 1236	2863	36.63	6.81	0.430	23 46 48.559
			3525.4				2863				
25	268	181 18 11.8		+1.12	+0.66	1.002 8373		36.77	+6.75	+0.424	23 42 52.657
26	269	182 16 59.1	3527.3	1.11	0.59	1.002 5511	-2862	36.90	6.69	0.417	23 38 56.755
27	270	183 15 48.3	3529.2	1.08	0.49	1.002 2653	2858	37.04	6.64	0.409	23 35 00.854
28	271	184 14 39.5	3531.2	1.03	0.38	1.001 9800	2853	37.18	6.58	0.401	23 31 04.952
29	272	185 13 32.6	3533.1	0.96	0.26	1.001 6951	2849	37.32	6.52	0.393	23 27 09.050
			3535.3				2841				
30	273	186 12 27.9		+0.90	+0.13	1.001 4110		37.46	+6.46	+0.386	23 23 13.146
Oct. 1	274	187 11 25.3	3537.4	+0.85	+0.02	1.001 1275	-2835	37.59	+6.40	+0.381	23 19 17.240

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

FOR 0^h UNIVERSAL TIME

Date		Day of the Week	Apparent Right Ascension				Apparent Declination				Semi-diameter	Hor. Par.	Equation of Time App.—Mean				Sidereal Time (Right Ascension of Mean Sun+12 ^h)			
			h	m	s		°	'	"		'	"		"	m	s		h	m	s
Oct.	1	We	12	26	50.66		—	2	54	03.4		16	00.42	8.79	+10	02.25		0	36	52.897
	2	Th	12	30	27.79	217.13		3	17	20.6	—1397.2	16	00.69	8.79	10	21.67	+19.42	0	40	49.448
	3	Fr	12	34	05.22	217.43		3	40	35.8	1395.2	16	00.96	8.80	10	40.79	19.12	0	44	46.001
	4	Sa	12	37	42.98	217.76		4	03	48.5	1392.7	16	01.23	8.80	10	59.58	18.79	0	48	42.556
	5	Su	12	41	21.09	218.11		4	26	58.5	1390.0	16	01.50	8.80	11	18.02	18.44	0	52	39.112
						218.49					1386.8					18.07				
	6	Mo	12	44	59.58		—	4	50	05.3		16	01.77	8.80	+11	36.09		0	56	35.668
	7	Tu	12	48	38.45	218.87		5	13	08.6	—1383.3	16	02.04	8.80	11	53.77	+17.68	1	00	32.224
	8	We	12	52	17.74	219.29		5	36	08.0	1379.4	16	02.31	8.81	12	11.03	17.26	1	04	28.778
	9	Th	12	55	57.46	219.72		5	59	03.2	1375.2	16	02.59	8.81	12	27.86	16.83	1	08	25.330
	10	Fr	12	59	37.63	220.17		6	21	53.8	1370.6	16	02.86	8.81	12	44.25	16.39	1	12	21.879
						220.64					1365.6					15.91				
	11	Sa	13	03	18.27		—	6	44	39.4		16	03.13	8.81	+13	00.16		1	16	18.427
	12	Su	13	06	59.39	221.12		7	07	19.6	—1360.2	16	03.41	8.82	13	15.59	+15.43	1	20	14.975
	13	Mo	13	10	41.00	221.61		7	29	54.0	1354.4	16	03.68	8.82	13	30.53	14.94	1	24	11.523
	14	Tu	13	14	23.12	222.12		7	52	22.3	1348.3	16	03.96	8.82	13	44.96	14.43	1	28	08.074
	15	We	13	18	05.77	222.65		8	14	44.0	1341.7	16	04.24	8.83	13	58.87	13.91	1	32	04.628
						223.18					1334.7					13.37				
	16	Th	13	21	48.95		—	8	36	58.7		16	04.51	8.83	+14	12.24		1	36	01.184
	17	Fr	13	25	32.68	223.73		8	59	06.0	—1327.3	16	04.79	8.83	14	25.06	+12.82	1	39	57.742
	18	Sa	13	29	16.98	224.30		9	21	05.6	1319.6	16	05.07	8.83	14	37.32	12.26	1	43	54.300
	19	Su	13	33	01.85	224.87		9	42	57.0	1311.4	16	05.35	8.84	14	49.00	11.68	1	47	50.858
	20	Mo	13	36	47.32	225.47		10	04	39.8	1302.8	16	05.63	8.84	15	00.08	11.08	1	51	47.414
						226.09					1294.0					10.46				
	21	Tu	13	40	33.41		—	10	26	13.8		16	05.90	8.84	+15	10.54		1	55	43.968
	22	We	13	44	20.12	226.71		10	47	38.4	—1284.6	16	06.18	8.84	15	20.38	+ 9.84	1	59	40.519
	23	Th	13	48	07.48	227.36		11	08	53.3	1274.9	16	06.45	8.85	15	29.58	9.20	2	03	37.068
	24	Fr	13	51	55.51	228.03		11	29	58.2	1264.9	16	06.72	8.85	15	38.10	8.52	2	07	33.617
	25	Sa	13	55	44.22	228.71		11	50	52.5	1254.3	16	06.99	8.85	15	45.95	7.85	2	11	30.165
						229.41					1243.6					7.14				
	26	Su	13	59	33.63		—	12	11	36.1		16	07.26	8.85	+15	53.09		2	15	26.714
	27	Mo	14	03	23.75	230.12		12	32	08.4	—1232.3	16	07.52	8.86	15	59.52	+ 6.43	2	19	23.264
	28	Tu	14	07	14.61	230.86		12	52	29.0	1220.6	16	07.79	8.86	16	05.22	5.70	2	23	19.815
	29	We	14	11	06.21	231.60		13	12	37.7	1208.7	16	08.04	8.86	16	10.17	4.95	2	27	16.368
	30	Th	14	14	58.58	232.37		13	32	33.9	1196.2	16	08.30	8.86	16	14.35	4.18	2	31	12.922
						233.15					1183.5					3.41				
Nov.	31	Fr	14	18	51.73		—	13	52	17.4		16	08.55	8.86	+16	17.76		2	35	09.478
	1	Sa	14	22	45.66	233.93		14	11	47.6	—1170.2	16	08.80	8.87	16	20.38	+ 2.62	2	39	06.036
	2	Su	14	26	40.41	234.75		14	31	04.2	1156.6	16	09.05	8.87	16	22.19	1.81	2	43	02.594
	3	Mo	14	30	35.97	235.56		14	50	06.9	1142.7	16	09.29	8.87	16	23.18	0.99	2	46	59.151
	4	Tu	14	34	32.35	236.38		15	08	55.1	1128.2	16	09.53	8.87	16	23.35	+ 0.17	2	50	55.707
						237.22					1113.5					— 0.67				
	5	We	14	38	29.57		—	15	27	28.6		16	09.77	8.88	+16	22.68		2	54	52.262
	6	Th	14	42	27.65	238.08		15	45	46.8	—1098.2	16	10.01	8.88	16	21.16	— 1.52	2	58	48.814
	7	Fr	14	46	26.56	238.91		16	03	49.4	1082.6	16	10.24	8.88	16	18.80	2.36	3	02	45.365
	8	Sa	14	50	26.34	239.78		16	21	36.1	1066.7	16	10.47	8.88	16	15.58	3.22	3	06	41.915
	9	Su	14	54	26.97	240.63		16	39	06.2	1050.1	16	10.71	8.88	16	11.51	4.07	3	10	38.465
						241.49					1033.3					4.94				
	10	Mo	14	58	28.46		—	16	56	19.5		16	10.94	8.89	+16	06.57		3	14	35.017
	11	Tu	15	02	30.80	242.34		17	13	15.6	—1016.1	16	11.16	8.89	16	00.78	— 5.79	3	18	31.572
	12	We	15	06	33.99	243.19		17	29	54.0	998.4	16	11.39	8.89	15	54.15	6.63	3	22	28.129
	13	Th	15	10	38.03	244.04		17	46	14.3	980.3	16	11.62	8.89	15	46.66	7.49	3	26	24.689
14	Fr	15	14	42.91	244.88		18	02	16.0	961.7	16	11.84	8.89	15	38.34	8.32	3	30	21.251	
					245.71					942.9					9.16					
15	Sa	15	18	48.62		—	18	17	58.9		16	12.07	8.90	+15	29.18		3	34	17.812	
16	Su	15	22	55.17	246.55		—	18	33	22.4	— 923.5	16	12.29	8.90	+15	19.19	— 9.99	3	38	14.371

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*		Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h		
		Mean Equinox of 1950.0	Ecliptic of 1950.0	Ecliptic of 1958.0								
		° ' "	"	"	"		"	"	s	h m s		
Oct.	1	274	187 11 25.3	3539.5	+0.85	+0.02	1.001 1275	-2830	37.59	+6.40	+0.381	23 19 17.240
	2	275	188 10 24.8	3541.8	0.80	-0.10	1.000 8445	2824	37.73	6.34	0.377	23 15 21.333
	3	276	189 09 26.6	3544.0	0.77	0.21	1.000 5621	2819	37.87	6.29	0.374	23 11 25.424
	4	277	190 08 30.6	3546.3	0.75	0.27	1.000 2802	2816	38.01	6.23	0.374	23 07 29.514
	5	278	191 07 36.9	3548.5	0.76	0.33	0.999 9986	2814	38.14	6.17	0.374	23 03 33.604
	6	279	192 06 45.4	3551.0	+0.80	-0.35	0.999 7172	-2814	38.28	+6.12	+0.375	22 59 37.694
	7	280	193 05 56.4	3553.2	0.86	0.34	0.999 4358	2814	38.42	6.06	0.376	22 55 41.786
	8	281	194 05 09.6	3555.6	0.96	0.31	0.999 1544	2819	38.56	6.01	0.374	22 51 45.879
	9	282	195 04 25.2	3557.9	1.08	0.25	0.998 8725	2825	38.69	5.96	0.371	22 47 49.976
	10	283	196 03 43.1	3560.2	1.23	0.16	0.998 5900	2833	38.83	5.90	0.365	22 43 54.074
	11	284	197 03 03.3	3562.3	+1.42	-0.03	0.998 3067	-2844	38.97	+5.85	+0.358	22 39 58.172
	12	285	198 02 25.6	3564.5	1.62	+0.11	0.998 0223	2853	39.11	5.80	0.350	22 36 02.269
	13	286	199 01 50.1	3566.5	1.82	0.25	0.997 7370	2864	39.24	5.75	0.343	22 32 06.365
	14	287	200 01 16.6	3568.4	2.03	0.40	0.997 4506	2872	39.38	5.70	0.338	22 28 10.457
	15	288	201 00 45.0	3570.3	2.22	0.53	0.997 1634	2879	39.52	5.65	0.337	22 24 14.547
	16	289	202 00 15.3	3572.1	+2.41	+0.66	0.996 8755	-2881	39.66	+5.61	+0.337	22 20 18.635
	17	290	202 59 47.4	3573.9	2.57	0.77	0.996 5874	2880	39.79	5.56	0.340	22 16 22.722
	18	291	203 59 21.3	3575.6	2.70	0.84	0.996 2994	2876	39.93	5.52	0.343	22 12 26.810
	19	292	204 58 56.9	3577.3	2.81	0.89	0.996 0118	2865	40.07	5.47	0.346	22 08 30.900
	20	293	205 58 34.2	3579.1	2.87	0.90	0.995 7253	2851	40.21	5.43	0.346	22 04 34.992
	21	294	206 58 13.3	3580.7	+2.90	+0.87	0.995 4402	-2835	40.35	+5.39	+0.344	22 00 39.087
	22	295	207 57 54.0	3582.6	2.90	0.82	0.995 1567	2815	40.48	5.35	0.340	21 56 43.183
	23	296	208 57 36.6	3584.2	2.88	0.74	0.994 8752	2793	40.62	5.31	0.334	21 52 47.280
	24	297	209 57 20.8	3586.1	2.84	0.65	0.994 5959	2767	40.76	5.27	0.328	21 48 51.378
	25	298	210 57 06.9	3588.0	2.78	0.54	0.994 3192	2740	40.90	5.24	0.320	21 44 55.475
	26	299	211 56 54.9	3589.8	+2.71	+0.41	0.994 0452	-2711	41.03	+5.20	+0.314	21 40 59.571
	27	300	212 56 44.7	3591.7	2.64	0.29	0.993 7741	2681	41.17	5.17	0.309	21 37 03.666
	28	301	213 56 36.4	3593.7	2.57	0.18	0.993 5060	2650	41.31	5.14	0.304	21 33 07.759
	29	302	214 56 30.1	3595.7	2.51	+0.06	0.993 2410	2619	41.45	5.11	0.302	21 29 11.851
	30	303	215 56 25.8	3597.7	2.46	-0.04	0.992 9791	2588	41.58	5.08	0.301	21 25 15.941
Nov.	31	304	216 56 23.5	3599.7	+2.41	-0.14	0.992 7203	-2555	41.72	+5.05	+0.301	21 21 20.030
	1	305	217 56 23.2	3601.8	2.39	0.20	0.992 4618	2526	41.86	5.02	0.303	21 17 24.118
	2	306	218 56 25.0	3603.9	2.41	0.23	0.992 2122	2497	42.00	5.00	0.306	21 13 28.206
	3	307	219 56 28.9	3606.1	2.45	0.24	0.991 9625	2468	42.13	4.98	0.308	21 09 32.295
	4	308	220 56 35.0	3608.1	2.52	0.21	0.991 7157	2441	42.27	4.96	0.309	21 05 36.386
	5	309	221 56 43.1	3610.3	+2.62	-0.16	0.991 4716	-2418	42.41	+4.94	+0.308	21 01 40.480
	6	310	222 56 53.4	3612.4	2.75	-0.07	0.991 2298	2397	42.55	4.92	0.305	20 57 44.575
	7	311	223 57 05.8	3614.4	2.91	+0.04	0.990 9901	2377	42.69	4.90	0.301	20 53 48.671
	8	312	224 57 20.2	3616.4	3.08	0.17	0.990 7524	2361	42.82	4.89	0.295	20 49 52.767
	9	313	225 57 36.6	3618.4	3.27	0.32	0.990 5163	2346	42.96	4.88	0.290	20 45 56.861
	10	314	226 57 55.0	3620.2	+3.45	+0.46	0.990 2817	-2332	43.10	+4.87	+0.286	20 42 00.952
	11	315	227 58 15.2	3621.9	3.63	0.60	0.990 0485	2319	43.24	4.86	0.286	20 38 05.041
	12	316	228 58 37.1	3623.5	3.79	0.72	0.989 8166	2304	43.37	4.85	0.288	20 34 09.127
	13	317	229 59 00.6	3625.1	3.93	0.83	0.989 5862	2287	43.51	4.84	0.293	20 30 13.212
	14	318	230 59 25.7	3626.5	4.06	0.91	0.989 3575	2268	43.65	4.84	0.299	20 26 17.297
	15	319	231 59 52.2	3627.9	+4.14	+0.96	0.989 1307	-2244	43.79	+4.83	+0.304	20 22 21.383
16	320	233 00 20.1		+4.20	+0.98	0.988 9063		43.92	+4.83	+0.309	20 18 25.471	

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

FOR 0^h UNIVERSAL TIME

Date		Day of the Week	Apparent Right Ascension		Apparent Declination		Semi- diameter	Hor. Par.	Equation of Time App.—Mean		Sidereal Time (Right Ascen- sion of Mean Sun+12 ^h)	
			h	m s	° ' "	"	' "	"	m s	s	h m s	s
Nov.	16	Su	15 22 55.17		-18 33 22.4		16 12.29	8.90	+15 19.19		3 38 14.371	
	17	Mo	15 27 02.54	247.37	18 48 26.2	-903.8	16 12.50	8.90	15 08.38	-10.81	3 42 10.929	
	18	Tu	15 31 10.72	248.18	19 03 09.9	883.7	16 12.72	8.90	14 56.75	11.63	3 46 07.484	
	19	We	15 35 19.72	249.00	19 17 33.2	863.3	16 12.93	8.90	14 44.30	12.45	3 50 04.036	
	20	Th	15 39 29.53	249.81	19 31 35.6	842.4	16 13.14	8.91	14 31.05	13.25	3 54 00.587	
				250.61		821.2				14.05		
	21	Fr	15 43 40.14		-19 45 16.8		16 13.34	8.91	+14 17.00		3 57 57.138	
	22	Sa	15 47 51.54	251.40	19 58 36.4	-799.6	16 13.54	8.91	14 02.16	-14.84	4 01 53.689	
	23	Su	15 52 03.73	252.19	20 11 34.1	777.7	16 13.74	8.91	13 46.52	15.64	4 05 50.241	
	24	Mo	15 56 16.69	252.96	20 24 09.5	755.4	16 13.93	8.91	13 30.11	16.41	4 09 46.795	
	25	Tu	16 00 30.43	253.74	20 36 22.3	732.8	16 14.12	8.92	13 12.93	17.18	4 13 43.350	
				254.49		709.8				17.94		
	26	We	16 04 44.92		-20 48 12.1		16 14.30	8.92	+12 54.99		4 17 39.906	
	27	Th	16 09 00.16	255.24	20 59 38.7	-686.6	16 14.48	8.92	12 36.31	-18.68	4 21 36.465	
	28	Fr	16 13 16.14	255.98	21 10 41.6	662.9	16 14.65	8.92	12 16.89	19.42	4 25 33.024	
Dec.	29	Sa	16 17 32.84	256.70	21 21 20.6	639.0	16 14.81	8.92	11 56.74	20.15	4 29 29.585	
	30	Su	16 21 50.25	257.41	21 31 35.4	614.8	16 14.97	8.92	11 35.89	20.85	4 33 26.145	
				258.10		590.3				21.54		
	1	Mo	16 26 08.35		-21 41 25.7		16 15.13	8.92	+11 14.35		4 37 22.704	
	2	Tu	16 30 27.13	258.78	21 50 51.1	-565.4	16 15.28	8.93	10 52.13	-22.22	4 41 19.261	
	3	We	16 34 46.57	259.44	21 59 51.4	540.3	16 15.43	8.93	10 29.24	22.89	4 45 15.817	
	4	Th	16 39 06.64	260.07	22 08 26.3	514.9	16 15.57	8.93	10 05.73	23.51	4 49 12.370	
	5	Fr	16 43 27.33	260.69	22 16 35.6	489.3	16 15.71	8.93	9 41.59	24.14	4 53 08.922	
				261.29		463.3				24.72		
	6	Sa	16 47 48.62		-22 24 18.9		16 15.84	8.93	+ 9 16.87		4 57 05.474	
	7	Su	16 52 10.46	261.84	22 31 36.2	-437.3	16 15.97	8.93	8 51.57	-25.30	5 01 02.028	
	8	Mo	16 56 32.85	262.39	22 38 27.0	410.8	16 16.10	8.93	8 25.75	25.82	5 04 58.583	
	9	Tu	17 00 55.74	262.89	22 44 51.3	384.3	16 16.22	8.93	7 59.41	26.34	5 08 55.142	
	10	We	17 05 19.11	263.37	22 50 48.8	357.5	16 16.34	8.94	7 32.60	26.81	5 12 51.703	
				263.80		330.4				27.24		
	11	Th	17 09 42.91		-22 56 19.2		16 16.45	8.94	+ 7 05.36		5 16 48.266	
	12	Fr	17 14 07.12	264.21	23 01 22.5	-303.3	16 16.57	8.94	6 37.71	-27.65	5 20 44.829	
	13	Sa	17 18 31.69	264.57	23 05 58.4	275.9	16 16.68	8.94	6 09.69	28.02	5 24 41.392	
	14	Su	17 22 56.60	264.91	23 10 06.8	248.4	16 16.79	8.94	5 41.34	28.35	5 28 37.952	
	15	Mo	17 27 21.81	265.21	23 13 47.6	220.8	16 16.89	8.94	5 12.69	28.65	5 32 34.510	
				265.47		192.9				28.92		
	16	Tu	17 31 47.28		-23 17 00.5		16 16.99	8.94	+ 4 43.77		5 36 31.065	
	17	We	17 36 12.98	265.70	23 19 45.6	-165.1	16 17.08	8.94	4 14.63	-29.14	5 40 27.619	
	18	Th	17 40 38.87	265.89	23 22 02.7	137.1	16 17.17	8.94	3 45.30	29.33	5 44 24.171	
	19	Fr	17 45 04.92	266.05	23 23 51.7	109.0	16 17.26	8.94	3 15.80	29.50	5 48 20.724	
	20	Sa	17 49 31.11	266.19	23 25 12.6	80.9	16 17.34	8.94	2 46.18	29.62	5 52 17.277	
				266.28		52.6				29.73		
	21	Su	17 53 57.39		-23 26 05.2		16 17.42	8.95	+ 2 16.45		5 56 13.831	
	22	Mo	17 58 23.73	266.34	23 26 29.7	- 24.5	16 17.48	8.95	1 46.67	-29.78	6 00 10.387	
	23	Tu	18 02 50.10	266.37	23 26 25.9	+ 3.8	16 17.55	8.95	1 16.85	29.82	6 04 06.945	
	24	We	18 07 16.48	266.38	23 25 53.8	32.1	16 17.61	8.95	0 47.03	29.82	6 08 03.504	
	25	Th	18 11 42.82	266.34	23 24 53.5	60.3	16 17.66	8.95	+ 0 17.25	29.78	6 12 00.064	
				266.28		88.6				29.72		
	26	Fr	18 16 09.10		-23 23 24.9		16 17.70	8.95	- 0 12.47		6 15 56.626	
	27	Sa	18 20 35.29	266.19	23 21 28.1	+116.8	16 17.74	8.95	0 42.11	-29.64	6 19 53.187	
	28	Su	18 25 01.35	266.06	23 19 03.2	144.9	16 17.77	8.95	1 11.61	29.50	6 23 49.747	
	29	Mo	18 29 27.27	265.92	23 16 10.1	173.1	16 17.80	8.95	1 40.97	29.36	6 27 46.306	
	30	Tu	18 33 53.00	265.73	23 12 49.0	201.1	16 17.82	8.95	2 10.14	29.17	6 31 42.863	
				265.52		228.9				28.97		
	31	We	18 38 18.52		-23 09 00.1		16 17.84	8.95	- 2 39.11		6 35 39.417	
	32	Th	18 42 43.81	265.29	-23 04 43.3	+256.8	16 17.84	8.95	- 3 07.84	-28.73	6 39 35.970	

FOR 0^h UNIVERSAL TIME

Date	Day of the year	True Longitude*			Latitude		Radius Vector of the Earth	Prec. in Long.	Nut. in Long.	Nut. in R. A.	Civil Time of Sidereal 0 ^h
		Mean Equinox of 1950.0			Ecliptic of 1950.0	Ecliptic of 1958.0					
		°	'	"	"	"		"	"	s	h m s
Nov. 16	320	233 00 20.1			+4.20	+0.98	0.988 9063				
17	321	234 00 49.3	3629.2		4.21	0.97	0.988 6846	-2217	43.92	+4.83	20 18 25.471
18	322	235 01 19.8	3630.5		4.20	0.92	0.988 4659	2187	44.06	4.83	20 14 29.561
19	323	236 01 51.6	3631.8		4.17	0.85	0.988 2506	2153	44.20	4.83	20 10 33.654
20	324	237 02 24.6	3633.0		4.10	0.76	0.988 0391	2115	44.34	4.83	20 06 37.749
			3634.2					2075	44.47	4.84	20 02 41.844
21	325	238 02 58.8			+4.03	+0.65	0.987 8316				
22	326	239 03 34.3	3635.5		3.94	0.54	0.987 6284	-2032	44.61	+4.85	19 58 45.939
23	327	240 04 11.1	3636.8		3.85	0.41	0.987 4297	1987	44.75	4.85	19 54 50.033
24	328	241 04 49.1	3638.0		3.75	0.29	0.987 2358	1939	44.89	4.86	19 50 54.126
25	329	242 05 28.3	3639.2		3.66	0.17	0.987 0468	1890	45.02	4.87	19 46 58.217
			3640.6					1839	45.16	4.88	19 43 02.306
26	330	243 06 08.9			+3.57	+0.06	0.986 8629				
27	331	244 06 50.8	3641.9		3.51	-0.02	0.986 6841	-1788	45.30	+4.90	19 39 06.394
28	332	245 07 34.0	3643.2		3.47	0.09	0.986 5107	1734	45.44	4.91	19 35 10.481
29	333	246 08 18.6	3644.6		3.44	0.13	0.986 3425	1682	45.58	4.93	19 31 14.566
30	334	247 09 04.6	3646.0		3.45	0.15	0.986 1796	1629	45.71	4.94	19 27 18.652
			3647.3					1577	45.85	4.96	19 23 22.739
Dec. 1	335	248 09 51.9			+3.47	-0.15	0.986 0219				
2	336	249 10 40.7	3648.8		3.53	0.10	0.985 8692	-1527	45.99	+4.98	19 19 26.827
3	337	250 11 30.9	3650.2		3.62	-0.03	0.985 7214	1478	46.13	5.00	19 15 30.917
4	338	251 12 22.5	3651.6		3.74	+0.07	0.985 5783	1431	46.26	5.02	19 11 35.009
5	339	252 13 15.5	3653.0		3.87	0.19	0.985 4395	1388	46.40	5.05	19 07 39.103
			3654.4					1346	46.54	5.07	19 03 43.196
6	340	253 14 09.9			+4.01	+0.32	0.985 3049				
7	341	254 15 05.6	3655.7		4.17	0.46	0.985 1740	-1309	46.68	+5.09	18 59 47.289
8	342	255 16 02.6	3657.0		4.31	0.59	0.985 0467	1273	46.81	5.12	18 55 51.380
9	343	256 17 00.7	3658.1		4.44	0.72	0.984 9228	1239	46.95	5.15	18 51 55.468
10	344	257 17 59.9	3659.2		4.56	0.83	0.984 8021	1207	47.09	5.17	18 47 59.553
			3660.2					1177	47.23	5.20	18 44 03.637
11	345	258 19 00.1			+4.65	+0.91	0.984 6844				
12	346	259 20 01.1	3661.0		4.71	0.96	0.984 5699	-1145	47.36	+5.23	18 40 07.719
13	347	260 21 02.8	3661.7		4.74	0.98	0.984 4586	1113	47.50	5.26	18 36 11.802
14	348	261 22 05.2	3662.4		4.74	0.98	0.984 3508	1078	47.64	5.29	18 32 15.887
15	349	262 23 08.1	3662.9		4.69	0.93	0.984 2467	1041	47.78	5.32	18 28 19.975
			3663.4					1000	47.92	5.35	18 24 24.065
16	350	263 24 11.5			+4.62	+0.86	0.984 1467				
17	351	264 25 15.3	3663.8		4.54	0.77	0.984 0510	-957	48.05	+5.38	18 20 28.157
18	352	265 26 19.4	3664.1		4.44	0.67	0.983 9599	911	48.19	5.41	18 16 32.250
19	353	266 27 23.9	3664.5		4.31	0.54	0.983 8737	862	48.33	5.45	18 12 36.344
20	354	267 28 28.8	3664.9		4.17	0.41	0.983 7927	810	48.47	5.48	18 08 40.437
			3665.1					755	48.60	5.51	18 04 44.529
21	355	268 29 33.9			+4.06	+0.31	0.983 7172				
22	356	269 30 39.3	3665.4		3.95	0.20	0.983 6473	-699	48.74	+5.55	18 00 48.619
23	357	270 31 45.0	3665.7		3.83	+0.09	0.983 5832	641	48.88	5.58	17 56 52.708
24	358	271 32 51.0	3666.0		3.72	-0.01	0.983 5251	581	49.02	5.61	17 52 56.795
25	359	272 33 57.2	3666.2		3.64	0.08	0.983 4731	520	49.15	5.65	17 49 00.881
			3666.5					456	49.29	5.68	17 45 04.965
26	360	273 35 03.7			+3.58	-0.13	0.983 4275				
27	361	274 36 10.5	3666.8		3.55	0.15	0.983 3882	-393	49.43	+5.71	17 41 09.050
28	362	275 37 17.7	3667.2		3.55	0.14	0.983 3553	329	49.57	5.74	17 37 13.135
29	363	276 38 25.2	3667.5		3.58	0.10	0.983 3288	265	49.70	5.77	17 33 17.222
30	364	277 39 33.0	3667.8		3.63	-0.03	0.983 3086	202	49.84	5.81	17 29 21.311
			3668.3					142	49.98	5.84	17 25 25.401
31	365	278 40 41.3			+3.69	+0.05	0.983 2944				
32	366	279 41 49.9	3668.6		+3.79	+0.15	0.983 2860	-84	50.12	+5.87	17 21 29.491
									50.25	+5.90	17 17 33.587

*To obtain the longitude referred to the mean equinox of 1958.0 add 6' 42".15.

LATITUDE, ECLIPTIC OF DATE

FOR 0^h UNIVERSAL TIME

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	"	"	"	"	"	"	"	"	"	"	"	"
1	-0.18	-0.58	-0.69	-0.84	-0.62	-0.04	+0.40	+0.59	+0.37	+0.06	-0.40	-0.56
2	0.31	0.67	0.75	0.79	0.49	+0.09	0.47	0.55	0.25	-0.06	0.48	0.56
3	0.43	0.73	0.79	0.71	0.35	0.21	0.52	0.48	+0.13	0.18	0.51	0.52
4	0.55	0.75	0.80	0.61	0.20	0.31	0.53	0.39	0.00	0.28	0.52	0.45
5	-0.65	-0.75	-0.77	-0.47	-0.06	+0.38	+0.51	+0.29	-0.12	-0.37	-0.50	-0.35
6	0.73	0.72	0.72	0.33	+0.08	0.42	0.47	0.18	0.22	0.43	0.45	0.24
7	0.79	0.66	0.63	0.19	0.18	0.43	0.40	+0.06	0.31	0.46	0.37	-0.11
8	0.82	0.57	0.52	-0.05	0.27	0.42	0.31	-0.06	0.39	0.46	0.26	+0.03
9	-0.81	-0.47	-0.40	+0.08	+0.33	+0.38	+0.22	-0.17	-0.44	-0.43	-0.14	+0.16
10	0.78	0.34	0.26	0.18	0.37	0.31	+0.10	0.28	0.46	0.38	0.00	0.28
11	0.71	0.21	-0.13	0.26	0.37	0.22	-0.01	0.37	0.44	0.29	+0.14	0.38
12	0.61	-0.08	+0.01	0.31	0.34	+0.11	0.13	0.44	0.40	0.17	0.27	0.46
13	-0.50	+0.05	+0.12	+0.33	+0.29	0.00	-0.25	-0.48	-0.33	-0.04	+0.39	+0.52
14	0.37	0.16	0.21	0.33	0.21	-0.12	0.35	0.49	0.23	+0.10	0.50	0.54
15	0.24	0.25	0.28	0.29	+0.11	0.24	0.43	0.47	-0.11	0.24	0.57	0.53
16	-0.10	0.31	0.32	0.22	-0.01	0.35	0.49	0.43	+0.03	0.37	0.61	0.48
17	+0.03	+0.34	+0.33	+0.13	-0.13	-0.46	-0.53	-0.35	+0.17	+0.50	+0.63	+0.40
18	0.14	0.34	0.31	+0.03	0.25	0.54	0.54	0.24	0.31	0.59	0.61	0.32
19	0.22	0.31	0.26	-0.09	0.37	0.60	0.51	-0.12	0.44	0.66	0.56	0.22
20	0.28	0.26	0.19	0.22	0.49	0.63	0.46	+0.01	0.55	0.70	0.49	+0.09
21	+0.31	+0.19	+0.09	-0.35	-0.59	-0.64	-0.38	+0.15	+0.64	+0.70	+0.39	-0.04
22	0.32	+0.10	-0.02	0.48	0.68	0.61	0.28	0.29	0.70	0.67	0.28	0.15
23	0.30	0.00	0.14	0.61	0.74	0.55	0.15	0.42	0.73	0.61	0.16	0.26
24	0.25	-0.12	0.27	0.70	0.77	0.47	-0.02	0.52	0.72	0.53	+0.04	0.37
25	+0.18	-0.25	-0.40	-0.78	-0.76	-0.36	+0.12	+0.60	+0.68	+0.43	-0.10	-0.47
26	+0.09	0.37	0.52	0.83	0.73	0.23	0.25	0.66	0.62	0.31	0.22	0.54
27	-0.02	0.49	0.63	0.86	0.66	-0.09	0.37	0.68	0.55	0.18	0.33	0.59
28	0.13	0.60	0.73	0.84	0.57	+0.05	0.47	0.66	0.45	+0.05	0.42	0.61
29	-0.25	-0.69	-0.80	-0.79	-0.45	+0.18	+0.54	+0.62	+0.33	-0.07	-0.49	-0.60
30	0.37	0.75	0.84	0.72	0.32	0.30	0.59	0.56	0.19	0.19	0.54	0.56
31	0.48	0.79	0.86	0.62	0.18	0.40	0.60	0.48	+0.06	0.30	0.56	0.49
32	0.58	0.80	0.84	0.49	-0.04	0.47	0.59	0.37	-0.06	0.40	0.56	0.41
33	-0.67	-0.77	-0.79	-0.35	+0.09	+0.52	+0.55	+0.25	-0.18	-0.48	-0.52	-0.30

OBLIQUITY OF THE ECLIPTIC, SUN'S ABERRATION, AND SUN'S
MEAN LONGITUDEFOR 0^h UNIVERSAL TIME

Date	True Obliq- uity	Aberration	Mean Longitude	Date	True Obliq- uity	Aberration	Mean Longitude
	23° 26'				23° 26'		
	"	"	°		"	"	°
Jan. 0	33.22	20.81	279.1571	July 4	32.14	20.13	101.5019
5	33.22	20.81	284.0853	9	32.16	20.13	106.4301
10	33.24	20.81	289.0136	14	32.18	20.13	111.3583
15	33.28	20.80	293.9418	19	32.22	20.14	116.2866
20	33.32	20.80	298.8701	24	32.27	20.15	121.2148
25	33.38	20.79	303.7983	29	32.33	20.16	126.1431
30	33.45	20.77	308.7265	Aug. 3	32.39	20.17	131.0713
Feb. 4	33.51	20.76	313.6548	8	32.46	20.18	135.9995
9	33.58	20.74	318.5830	13	32.52	20.20	140.9278
14	33.65	20.72	323.5112	18	32.59	20.22	145.8560
19	33.70	20.70	328.4395	23	32.65	20.24	150.7842
24	33.75	20.68	333.3677	28	32.70	20.26	155.7125
Mar. 1	33.79	20.65	338.2960	Sept. 2	32.75	20.28	160.6407
6	33.82	20.63	343.2242	7	32.78	20.31	165.5689
11	33.83	20.60	348.1524	12	32.80	20.34	170.4972
16	33.83	20.57	353.0807	17	32.80	20.36	175.4254
21	33.81	20.54	358.0089	22	32.79	20.39	180.3537
26	33.77	20.51	2.9371	27	32.77	20.42	185.2819
31	33.72	20.49	7.8654	Oct. 2	32.73	20.45	190.2101
Apr. 5	33.65	20.46	12.7936	7	32.67	20.48	195.1384
10	33.56	20.43	17.7218	12	32.59	20.50	200.0666
15	33.47	20.40	22.6501	17	32.50	20.53	204.9948
20	33.36	20.37	27.5783	22	32.41	20.56	209.9231
25	33.25	20.34	32.5066	27	32.30	20.59	214.8513
30	33.13	20.32	37.4348	Nov. 1	32.18	20.62	219.7795
May 5	33.01	20.29	42.3630	6	32.06	20.65	224.7078
10	32.88	20.27	47.2913	11	31.94	20.67	229.6360
15	32.77	20.24	52.2195	16	31.82	20.69	234.5643
20	32.65	20.22	57.1477	21	31.71	20.72	239.4925
25	32.54	20.20	62.0760	26	31.60	20.74	244.4207
30	32.44	20.19	67.0042	Dec. 1	31.51	20.75	249.3490
June 4	32.36	20.17	71.9324	6	31.42	20.77	254.2772
9	32.29	20.16	76.8607	11	31.35	20.78	259.2054
14	32.23	20.15	81.7889	16	31.30	20.79	264.1337
19	32.18	20.14	86.7172	21	31.27	20.80	269.0619
24	32.15	20.13	91.6454	26	31.25	20.81	273.9902
29	32.14	20.13	96.5736	31	31.25	20.81	278.9184
July 4	32.14	20.13	101.5019	36	31.27	20.81	283.8466

SUN, 1958
FOR 0^h UNIVERSAL TIME

		Mean Equator and Equinox of 1958.0											
Date		X				Y				Z			
Jan.	0	+0.154	7547	-495		-0.890	8799	+2770		-0.386	3454	+1200	
	1	0.171	9969	548	+17 2422	0.888	1970	2754	+2 6829	0.385	1826	1194	+1 1628
	2	0.189	1843	599	17 1874	0.885	2387	2743	2 9583	0.383	9004	1191	1 2822
	3	0.206	3118	648	17 1275	0.882	0061	2732	3 2326	0.382	4991	1186	1 4013
	4	0.223	3745	699	17 0627	0.878	5003	2720	3 5058	0.380	9792	1179	1 5199
					16 9928				3 7778				1 6378
	5	+0.240	3673	-746		-0.874	7225	+2707		-0.379	3414	+1177	
	6	0.257	2855	796	+16 9182	0.870	6740	2692	+4 0485	0.377	5859	1168	+1 7555
	7	0.274	1241	844	16 8386	0.866	3563	2683	4 3177	0.375	7136	1165	1 8723
	8	0.290	8783	893	16 7542	0.861	7703	2671	4 5860	0.373	7248	1160	1 9888
	9	0.307	5432	940	16 6649	0.856	9172	2657	4 8531	0.371	6200	1154	2 1018
					16 5709				5 1188				2 2202
	10	+0.324	1141	-992		-0.851	7984	+2646		-0.369	3998	+1149	
	11	0.340	5858	1042	+16 4717	0.846	4150	2632	+5 3834	0.367	0647	1142	+2 3351
	12	0.356	9533	1094	16 3675	0.840	7684	2620	5 6466	0.364	6154	1137	2 4493
	13	0.373	2114	1145	16 2581	0.834	8598	2604	5 9086	0.362	0524	1130	2 5630
	14	0.389	3550	1197	16 1436	0.828	6908	2585	6 1690	0.359	3764	1121	2 6760
					16 0239				6 4275				2 7881
	15	+0.405	3789	-1252		-0.822	2633	+2571		-0.356	5883	+1115	
	16	0.421	2776	1302	+15 8987	0.815	5787	2548	+6 6846	0.353	6887	1105	+2 8996
	17	0.437	0461	1356	15 7685	0.808	6393	2530	6 9394	0.350	6786	1093	3 0101
	18	0.452	6790	1407	15 6329	0.801	4469	2504	7 1924	0.347	5592	1086	3 1194
	19	0.468	1712	1461	15 4922	0.794	0041	2482	7 4428	0.344	3312	1076	3 2280
					15 3461				7 6910				3 3356
	20	+0.483	5173	-1507		-0.786	3131	+2454		-0.340	9956	+1061	
	21	0.498	7127	1560	+15 1954	0.778	3767	2427	+7 9364	0.337	5539	1052	+3 4417
	22	0.513	7521	1607	15 0394	0.770	1976	2400	8 1791	0.334	0070	1040	3 5469
	23	0.528	6308	1655	14 8787	0.761	7785	2369	8 4191	0.330	3561	1024	3 6509
	24	0.543	3440	1699	14 7132	0.753	1225	2339	8 6560	0.326	6028	1015	3 7533
					14.5433				8 8899				3 8548
	25	+0.557	8873	-1744		-0.744	2326	+2307		-0.322	7480	+1000	
	26	0.572	2562	1789	+14 3689	0.735	1120	2277	+9 1206	0.318	7932	987	+3 9548
	27	0.586	4462	1831	14 1900	0.725	7637	2244	9 3483	0.314	7397	972	4 0535
	28	0.600	4531	1873	14 0069	0.716	1910	2209	9 5727	0.310	5890	958	4 1507
	29	0.614	2727	1910	13 8196	0.706	3974	2176	9 7936	0.306	3425	944	4 2465
					13 6286				10 0112				4 3409
	30	+0.627	9013	-1954		-0.696	3862	+2145		-0.302	0016	+932	
Feb.	31	0.641	3345	1989	+13 4332	0.686	1605	2108	+10 2257	0.297	5675	914	+4 4341
	1	0.654	5688	2024	13 2343	0.675	7240	2073	10 4365	0.293	0420	900	4 5255
	2	0.667	6007	2061	13 0319	0.665	0802	2040	10 6438	0.288	4265	887	4 6155
	3	0.680	4265	2094	12 8258	0.654	2324	2006	10 8478	0.283	7223	872	4 7042
					12 6164				11 0484				4 7914
	4	+0.693	0429	-2129		-0.643	1840	+1973		-0.278	9309	+856	
	5	0.705	4464	2165	+12 4035	0.631	9383	1944	+11 2457	0.274	0539	845	+4 8770
	6	0.717	6334	2196	12 1870	0.620	4982	1907	11 4401	0.269	0924	828	4 9615
	7	0.729	6008	2231	11 9674	0.608	8674	1876	11 6308	0.264	0481	815	5 0443
	8	0.741	3451	2268	11 7443	0.597	0490	1841	11 8184	0.258	9223	800	5 1258
					11 5175				12 0025				5 2058
	9	+0.752	8626	-2304		-0.585	0465	+1811		-0.253	7165	+785	
	10	0.764	1497	2339	+11 2871	0.572	8629	1772	+12 1836	0.248	4322	768	+5 2843
	11	0.775	2029	2374	11 0532	0.560	5021	1740	12 3608	0.243	0711	754	5 3611
	12	0.786	0187	2412	10 8158	0.547	9673	1698	12 5348	0.237	6346	738	5 4365
	13	0.796	5933	2443	10 5746	0.535	2627	1661	12 7046	0.232	1243	717	5 5103
					10 3303				12 8707				5 5820
	14	+0.806	9236	-2481		-0.522	3920	+1621		-0.226	5423	+702	
	15	+0.817	0058	-2511	+10 0822	-0.509	3592	+1577	+13 0328	-0.220	8901	+682	+5 6522

FOR 0^h UNIVERSAL TIME

Date		Mean Equator and Equinox of 1958.0									
		X			Y			Z			
Feb.	15	+0.817 0058		-2511	-0.509 3592		+1577	-0.220 8901		+682	
	16	0.826 8369	+9 8311	2545	0.496 1687	+13 1905	1538	0.215 1697	+5 7204	666	
	17	0.836 4135	9 5766	2574	0.482 8244	13 3443	1488	0.209 3827	5 7870	644	
	18	0.845 7327	9 3192	2603	0.469 3313	13 4931	1449	0.203 5313	5 8514	627	
	19	0.854 7916	9 0589	2633	0.455 6933	13 6380	1403	0.197 6172	5 9141	606	
			8 7956			13 7783			5 9747		
	20	+0.863 5872		-2657	-0.441 9150		+1356	-0.191 6425		+589	
	21	0.872 1171	+8 5299	2681	0.428 0011	+13 9139	1310	0.185 6089	+6 0336	566	
	22	0.880 3789	8 2618	2705	0.413 9562	14 0449	1263	0.179 5187	6 0902	547	
	23	0.888 3702	7 9913	2728	0.399 7850	14 1712	1217	0.173 3738	6 1449	528	
	24	0.896 0887	7 7185	2746	0.385 4921	14 2929	1169	0.167 1761	6 1977	506	
			7 4439			14 4098			6 2483		
	25	+0.903 5326		-2769	-0.371 0823		+1121	-0.160 9278		+489	
	26	0.910 6996	+7 1670	2783	0.356 5604	+14 5219	1077	0.154 6306	+6 2972	466	
	27	0.917 5883	6 8887	2801	0.341 9308	14 6296	1026	0.148 2868	6 3438	445	
	28	0.924 1969	6 6086	2816	0.327 1986	14 7322	981	0.141 8985	6 3883	429	
Mar.	1	0.930 5239	6 3270	2830	0.312 3683	14 8303	935	0.135 4673	6 4312	405	
			6 0440			14 9238			6 4717		
	2	+0.936 5679		-2838	-0.297 4445		+888	-0.128 9956		+387	
	3	0.942 3281	+5 7602	2854	0.282 4319	+15 0126	843	0.122 4852	+6 5104	366	
	4	0.947 8029	5 4748	2862	0.267 3350	15 0969	799	0.115 9382	6 5470	351	
	5	0.952 9915	5 1886	2873	0.252 1582	15 1768	759	0.109 3561	6 5821	328	
	6	0.957 8928	4 9013	2885	0.236 9055	15 2527	711	0.102 7412	6 6149	311	
			4 6128			15 3238			6 6460		
	7	+0.962 5056		-2895	-0.221 5817		+674	-0.096 0952		+293	
	8	0.966 8289	+4 3233	2909	0.206 1905	+15 3912	628	0.089 4199	+6 6753	273	
	9	0.970 8613	4 0324	2920	0.190 7365	15 4540	587	0.082 7173	6 7026	254	
	10	0.974 6017	3 7404	2931	0.175 2238	15 5127	541	0.075 9893	6 7280	235	
	11	0.978 0490	3 4473	2945	0.159 6570	15 5608	496	0.069 2378	6 7515	214	
			3 1528			15 6164			6 7729		
	12	+0.981 2018		-2955	-0.144 0406		+449	-0.062 4649		+193	
	13	0.984 0591	+2 8573	2963	0.128 3793	+15 6613	404	0.055 6727	+6 7922	174	
	14	0.986 6201	2 5610	2975	0.112 6776	15 7017	352	0.048 8631	6 8096	153	
	15	0.988 8836	2 2635	2980	0.096 9407	15 7369	308	0.042 0382	6 8249	130	
	16	0.990 8491	1 9655	2988	0.081 1730	15 7677	253	0.035 2003	6 8379	110	
			1 6667			15 7930			6 8489		
	17	+0.992 5158		-2992	-0.065 3800		+208	-0.028 3514		+86	
	18	0.993 8833	+1 3675	2995	0.049 5662	+15 8138	156	0.021 4939	+6 8575	68	
	19	0.994 9513	1 0680	2999	0.033 7368	15 8294	105	0.014 6296	6 8643	44	
	20	0.995 7194	7681	2995	0.017 8969	15 8399	56	0.007 7609	6 8687	23	
	21	0.996 1880	4686	2996	-0.002 0514	15 8455	+ 4	-0.000 8899	6 8710	+ 3	
			+ 1690			15 8459			6 8713		
	22	+0.996 3570		-2996	+0.013 7945		- 44	+0.005 9814		- 21	
	23	0.996 2264	- 1306	2987	0.029 6360	+15 8415	97	0.012 8506	+6 8692	42	
	24	0.995 7971	4293	2986	0.045 4678	15 8318	143	0.019 7156	6 8650	60	
	25	0.995 0692	7279	2978	0.061 2853	15 8175	195	0.026 5746	6 8590	86	
	26	0.994 0435	1 0257	2968	0.077 0833	15 7980	241	0.033 4250	6 8504	103	
			1 3225			15 7739			6 8401		
	27	+0.992 7210		-2961	+0.092 8572		- 294	+0.040 2651		-127	
	28	0.991 1024	-1 6186	2948	0.108 6017	+15 7445	339	0.047 0925	+6 8274	144	
	29	0.989 1890	1 9134	2937	0.124 3123	15 7106	382	0.053 9055	6 8130	166	
	30	0.986 9819	2 2071	2923	0.139 9847	15 6724	433	0.060 7019	6 7964	185	
	31	0.984 4825	2 4994	2911	0.155 6138	15 6291	474	0.067 4798	6 7779	204	
			2 7905			15 5817			6 7575		
Apr.	1	+0.981 6920		-2896	+0.171 1955		- 518	+0.074 2373		-222	
	2	+0.978 6119	-3 0801	-2880	+0.186 7254	+15 5299	- 559	+0.080 9726	+6 7353	-242	

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Date		X				Y				Z			
Apr.	1	+0.981 6920		-2896		+0.171 1955		- 518		+0.074 2373		-222	
	2	0.978 6119	- 3 0801	2880		0.186 7254	+15 5299	559		0.080 9726	+6 7353	242	
	3	0.975 2438	3 3681	2869		0.202 1994	15 4740	599		0.087 6837	6 7111	259	
	4	0.971 5888	3 6550	2856		0.217 6135	15 4141	641		0.094 3689	6 6852	276	
	5	0.967 6482	3 9406	2843		0.232 9635	15 3500	680		0.101 0265	6 6576	297	
			4 2249				15 2820				6 6279		
	6	+0.963 4233		-2831		+0.248 2455		- 723		+0.107 6544		-312	
	7	0.958 9153	- 4 5080	2821		0.263 4552	+15 2097	762		0.114 2511	+6 5967	332	
	8	0.954 1252	4 7901	2804		0.278 5887	15 1335	806		0.120 8146	6 5635	350	
	9	0.949 0547	5 0705	2795		0.293 6416	15 0529	849		0.127 3431	6 5285	370	
	10	0.943 7047	5 3500	2777		0.308 6096	14 9680	894		0.133 8346	6 4915	388	
			5 6277				14 8786				6 4527		
	11	+0.938 0770		-2764		+0.323 4882		- 934		+0.140 2873		-408	
	12	0.932 1729*	- 5 9041	2748		0.338 2734	+14 7852	983		0.146 6992	+6 4119	427	
	13	0.925 9940	6 1789	2728		0.352 9603	14 6869	1024		0.153 0684	6 3692	446	
	14	0.919 5423	6 4517	2709		0.367 5448	14 5845	1070		0.159 3930	6 3246	466	
	15	0.912 8197	6 7226	2690		0.382 0223	14 4775	1115		0.165 6710	6 2780	485	
			6 9916				14 3660				6 2295		
	16	+0.905 8281		-2664		+0.396 3883		-1158		+0.171 9005		-502	
	17	0.898 5701	- 7 2580	2644		0.410 6385	+14 2502	1201		0.178 0798	+6 1793	522	
	18	0.891 0477	7 5224	2618		0.424 7686	14 1301	1246		0.184 2069	6 1271	540	
	19	0.883 2635	7 7842	2591		0.438 7741	14 0055	1286		0.190 2800	6 0731	560	
	20	0.875 2202	8 0433	2566		0.452 6510	13 8769	1328		0.196 2971	6 0171	574	
			8 2999				13 7441				5 9597		
	21	+0.866 9203		-2538		+0.466 3951		-1372		+0.202 2568		-596	
	22	0.858 3666	- 8 5537	2507		0.480 0020	+13 6069	1411		0.208 1569	+5 9001	610	
	23	0.849 5622	8 8044	2477		0.493 4678	13 4658	1451		0.213 9960	5 8391	626	
	24	0.840 5101	9 0521	2443		0.506 7885	13 3207	1489		0.219 7725	5 7765	647	
	25	0.831 2137	9 2964	2416		0.519 9603	13 1718	1526		0.225 4843	5 7118	660	
			9 5380				13 0192				5 6458		
26	+0.821 6757		-2376		+0.532 9795		-1563		+0.231 1301		-676		
27	0.811 9001	- 9 7756	2347		0.545 8424	+12 8629	1598		0.236 7083	+5 5782	690		
28	0.801 8898	10 0103	2310		0.558 5455	12 7031	1627		0.242 2175	5 5092	706		
29	0.791 6485	10 2413	2277		0.571 0859	12 5404	1664		0.247 6561	5 4386	717		
30	0.781 1795	10 4690	2244		0.583 4599	12 3740	1690		0.253 0230	5 3669	734		
		10 6934				12 2050				5 2935			
May	1	+0.770 4861		-2211		+0.595 6649		-1724		+0.258 3165		-746	
	2	0.759 5716	-10 9145	2178		0.607 6975	+12 0326	1751		0.263 5354	+5 2189	760	
	3	0.748 4393	11 1323	2145		0.619 5550	11 8575	1780		0.268 6783	5 1429	771	
	4	0.737 0925	11 3468	2117		0.631 2345	11 6795	1807		0.273 7441	5 0658	787	
	5	0.725 5340	11 5585	2085		0.642 7333	11 4988	1838		0.278 7312	4 9871	794	
			11 7670				11 3150				4 9077		
	6	+0.713 7670		-2054		+0.654 0483		-1872		+0.283 6389		-815	
	7	0.701 7946	-11 9724	2022		0.665 1761	+11 1278	1899		0.288 4651	+4 8262	825	
	8	0.689 6200	12 1746	1989		0.676 1140	10 9379	1930		0.293 2088	4 7437	838	
	9	0.677 2465	12 3735	1956		0.686 8589	10 7449	1961		0.297 8687	4 6599	852	
	10	0.664 6774	12 5691	1920		0.697 4077	10 5488	1995		0.302 4434	4 5747	868	
			12 7611				10 3493				4 4879		
	11	+0.651 9163		-1884		+0.707 7570		-2023		+0.306 9313		-877	
	12	0.638 9668	-12 9495	1849		0.717 9040	+10 1470	2054		0.311 3315	+4 4002	893	
	13	0.625 8324	13 1344	1809		0.727 8456	9 9416	2084		0.315 6424	4 3109	905	
	14	0.612 5171	13 3153	1768		0.737 5788	9 7332	2115		0.319 8628	4 2204	918	
	15	0.599 0250	13 4921	1733		0.747 1005	9 5217	2141		0.323 9914	4 1286	929	
		13 6654				9 3076				4 0357			
16	+0.585 3596		-1687		+0.756 4081		-2173		+0.328 0271		-942		
17	+0.571 5255	-13 8341	-1648		+0.765 4984	+ 9 0903	-2195		+0.331 9686	+3 9415	-952		

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		X				Y				Z			
May	17	+0.571	5255		-1648	+0.765	4984		-2195	+0.331	9686		-952
	18	0.557	5266	-13 9989	1605	0.774	3692	+8 8708	2225	0.335	8149	+3 8463	964
	19	0.543	3672	14 1594	1558	0.783	0175	8 6483	2249	0.339	5648	3 7499	975
	20	0.529	0520	14 3152	1518	0.791	4409	8 4234	2274	0.343	2172	3 6524	985
	21	0.514	5850	14 4670	1467	0.799	6369	8 1960	2296	0.346	7711	3 5539	996
				14 6137				7 9664				3 4543	
	22	+0.499	9713		-1425	+0.807	6033		-2320	+0.350	2254		-1004
	23	0.485	2151	-14 7562	1377	0.815	3377	+7 7344	2340	0.353	5793	+3 3539	1011
	24	0.470	3212	14 8939	1330	0.822	8381	7 5004	2357	0.356	8321	3 2528	1021
	25	0.455	2943	15 0269	1286	0.830	1028	7 2647	2373	0.359	9828	3 1507	1030
	26	0.440	1388	15 1555	1234	0.837	1302	7 0274	2392	0.363	0305	3 0477	1033
				15 2789				6 7882				2 9444	
	27	+0.424	8599		-1193	+0.843	9184		-2406	+0.365	9749		-1042
	28	0.409	4617	-15 3982	1146	0.850	4660	+6 5476	2417	0.368	8151	+2 8402	1050
	29	0.393	9489	15 5128	1102	0.856	7719	6 3059	2430	0.371	5503	2 7352	1052
	30	0.378	3259	15 6230	1059	0.862	8348	6 0629	2443	0.374	1803	2 6300	1059
	31	0.362	5970	15 7289	1017	0.868	6534	5 8186	2457	0.376	7044	2 5241	1066
				15 8306				5 5729				2 4175	
June	1	+0.346	7664		-972	+0.874	2263		-2465	+0.379	1219		-1070
	2	0.330	8386	-15 9278	936	0.879	5527	+5 3264	2479	0.381	4324	+2 3105	1078
	3	0.314	8172	16 0214	890	0.884	6312	5 0785	2493	0.383	6351	2 2027	1080
	4	0.298	7068	16 1104	850	0.889	4604	4 8292	2505	0.385	7298	2 0947	1088
	5	0.282	5114	16 1954	807	0.894	0391	4 5787	2517	0.387	7157	1 9859	1093
				16 2761				4 3270				1 8766	
	6	+0.266	2353		-764	+0.898	3661		-2531	+0.389	5923		-1100
	7	0.249	8828	-16 3525	720	0.902	4400	+4 0739	2546	0.391	3589	+1 7666	1106
	8	0.233	4583	16 4245	673	0.906	2593	3 8193	2557	0.393	0149	1 6560	1109
	9	0.216	9665	16 4918	628	0.909	8229	3 5636	2570	0.394	5600	1 5451	1118
	10	0.200	4119	16 5546	582	0.913	1295	3 3066	2582	0.395	9933	1 4333	1118
				16 6128				3 0484				1 3215	
	11	+0.183	7991		-535	+0.916	1779		-2591	+0.397	3148		-1124
	12	0.167	1328	-16 6663	485	0.918	9672	+2 7893	2601	0.398	5239	+1 2091	1129
	13	0.150	4180	16 7148	437	0.921	4964	2 5292	2609	0.399	6201	1 0962	1131
	14	0.133	6595	16 7585	389	0.923	7647	2 2683	2618	0.400	6032	9831	1137
	15	0.116	8621	16 7974	337	0.925	7712	2 0065	2627	0.401	4726	8694	1138
				16 8311				1 7438				7556	
	16	+0.100	0310		-290	+0.927	5150		-2629	+0.402	2282		-1138
	17	0.083	1709	-16 8601	236	0.928	9959	+1 4809	2638	0.402	8700	+ 6418	1143
	18	0.066	2872	16 8837	187	0.930	2130	1 2171	2639	0.403	3975	5275	1142
	19	0.049	3848	16 9024	134	0.931	1662	9532	2641	0.403	8108	4133	1146
	20	0.032	4690	16 9158	81	0.931	8553	6891	2641	0.404	1095	2987	1142
				16 9239				4250				1845	
	21	+0.015	5451		-33	+0.932	2803		-2640	+0.404	2940		-1144
	22	-0.001	3821	-16 9272	+ 20	0.932	4413	+ 1610	2637	0.404	3641	+ 701	1142
	23	0.018	3073	16 9252	67	0.932	3386	- 1027	2632	0.404	3200	- 441	1140
	24	0.035	2258	16 9185	117	0.931	9727	3659	2630	0.404	1619	1581	1139
	25	0.052	1326	16 9068	166	0.931	3438	6289	2618	0.403	8899	2720	1136
				16 8902				8907				3856	
	26	-0.069	0228		+ 208	+0.930	4531		-2616	+0.403	5043		-1133
	27	0.085	8922	-16 8694	256	0.929	3008	-1 1523	2608	0.403	0054	- 4989	1132
	28	0.102	7360	16 8438	302	0.927	8877	1 4131	2598	0.402	3933	6121	1128
	29	0.119	5496	16 8136	341	0.926	2148	1 6729	2595	0.401	6684	7249	1125
	30	0.136	3291	16 7795	389	0.924	2824	1 9324	2587	0.400	8310	8374	1125
				16 7406				2 1911				9499	
July	1	-0.153	0697		+ 428	+0.922	0913		-2581	+0.399	8811		-1119
	2	-0.169	7675	-16 6978	+ 472	+0.919	6421	-2 4492	-2571	+0.398	8193	-1 0618	-1119

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Date		X			Y			Z			
July	1	-0.153 0697		+ 428	+0.922 0913		-2581	+0.399 8811		-1119	
	2	0.169 7675	-16 6978	472	0.919 6421	- 2 4492	2571	0.398 8193	-1 0618	1119	
	3	0.186 4181	16 6506	518	0.916 9358	2 7063	2571	0.397 6456	1 1737	1115	
	4	0.203 0169	16 5988	559	0.913 9724	2 9634	2562	0.396 3604	1 2852	1112	
	5	0.219 5598	16 5429	606	0.910 7528	3 2196	2557	0.394 9640	1 3964	1110	
			16 4823			3 4753			1 5074		
	6	-0.236 0421		+ 650	+0.907 2775		-2549	+0.393 4566		-1108	
	7	0.252 4594	-16 4173	695	0.903 5473	- 3 7302	2543	0.391 8384	-1 6182	1103	
	8	0.268 8072	16 3478	744	0.899 5628	3 9845	2534	0.390 1099	1 7285	1100	
	9	0.285 0806	16 2734	787	0.895 3249	4 2379	2524	0.388 2714	1 8385	1094	
	10	0.301 2753	16 1947	836	0.890 8346	4 4903	2514	0.386 3235	1 9479	1090	
			16 1111			4 7417			2 0569		
	11	-0.317 3864		+ 882	+0.886 0929		-2505	+0.384 2666		-1086	
	12	0.333 4093	-16 0229	930	0.881 1007	- 4 9922	2494	0.382 1011	-2 1655	1081	
	13	0.349 3392	15 9299	978	0.875 8591	5 2416	2478	0.379 8275	2 2736	1075	
	14	0.365 1713	15 8321	1022	0.870 3697	5 4894	2467	0.377 4464	2 3811	1068	
	15	0.380 9012	15 7299	1076	0.864 6336	5 7361	2452	0.374 9585	2 4879	1062	
			15 6223			5 9813			2 5941		
	16	-0.396 5235		+1119	+0.858 6523		-2435	+0.372 3644		-1054	
	17	0.412 0339	-15 5104	1171	0.852 4275	- 6 2248	2416	0.369 6649	-2 6995	1047	
	18	0.427 4272	15 3933	1215	0.845 9611	6 4664	2400	0.366 8607	2 8042	1037	
	19	0.442 6990	15 2718	1263	0.839 2547	6 7064	2373	0.363 9528	2 9079	1030	
	20	0.457 8445	15 1455	1308	0.832 3110	6 9437	2354	0.360 9419	3 0109	1019	
			15 0147			7 1791			3 1128		
	21	-0.472 8592		+1350	+0.825 1319		-2329	+0.357 8291		-1008	
	22	0.487 7389	-14 8797	1396	0.817 7199	- 7 4120	2306	0.354 6155	-3 2136	1000	
	23	0.502 4790	14 7401	1432	0.810 0773	7 6426	2278	0.351 3019	3 3136	988	
	24	0.517 0759	14 5969	1474	0.802 2069	7 8704	2258	0.347 8895	3 4124	979	
	25	0.531 5254	14 4495	1514	0.794 1107	8 0962	2229	0.344 3792	3 5103	968	
			14 2981			8 3191			3 6071		
	26	-0.545 8235		+1547	+0.785 7916		-2205	+0.340 7721		- 957	
	27	0.559 9669	-14 1434	1587	0.777 2520	- 8 5396	2179	0.337 0693	-3 7028	946	
	28	0.573 9516	13 9847	1623	0.768 4945	8 7575	2157	0.333 2719	3 7974	937	
	29	0.587 7740	13 8224	1656	0.759 5213	8 9732	2131	0.329 3808	3 8911	927	
	30	0.601 4308	13 6568	1693	0.750 3350	9 1863	2110	0.325 3970	3 9838	915	
			13 4875			9 3973			4 0753		
Aug.	31	-0.614 9183		+1731	+0.740 9377		-2084	+0.321 3217		- 906	
	1	0.628 2327	-13 3144	1765	0.731 3320	- 9 6057	2059	0.317 1558	-4 1659	894	
	2	0.641 3706	13 1379	1802	0.721 5204	9 8116	2039	0.312 9005	4 2553	885	
	3	0.654 3283	12 9577	1838	0.711 5049	10 0155	2011	0.308 5567	4 3438	874	
	4	0.667 1022	12 7739	1874	0.701 2883	10 2166	1989	0.304 1255	4 4312	862	
			12 5865			10 4155			4 5174		
	5	-0.679 6887		+1914	+0.690 8728		-1960	+0.299 6081		- 850	
	6	0.692 0838	-12 3951	1950	0.680 2613	-10 6115	1933	0.295 0057	-4 6024	839	
	7	0.704 2839	12 2001	1984	0.669 4565	10 8048	1910	0.290 3194	4 6863	828	
	8	0.716 2856	12 0017	2025	0.658 4607	10 9958	1878	0.285 5503	4 7691	815	
	9	0.728 0848	11 7992	2059	0.647 2771	11 1836	1850	0.280 6997	4 8506	801	
			11 5933			11 3686			4 9307		
	10	-0.739 6781		+2095	+0.635 9085		-1822	+0.275 7690		- 787	
	11	0.751 0619	-11 3838	2134	0.624 3577	-11 5508	1788	0.270 7596	-5 0094	777	
	12	0.762 2323	11 1704	2171	0.612 6281	11 7296	1758	0.265 6725	5 0871	758	
	13	0.773 1856	10 9533	2206	0.600 7227	11 9054	1725	0.260 5096	5 1629	748	
	14	0.783 9183	10 7327	2241	0.588 6448	12 0779	1691	0.255 2719	5 2377	731	
			10 5086			12 2470			5 3108		
	15	-0.794 4269		+2274	+0.576 3978		-1649	+0.249 9611		- 714	
	16	-0.804 7081	-10 2812	+2312	+0.563 9859	-12 4119	-1617	+0.244 5789	-5 3822	- 700	

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Date		Mean Equator and Equinox of 1958.0									
		X				Y				Z	
Aug.	16	-0.804 7081		+2312		+0.563 9859	-1617			+0.244 5789	-700
	17	0.814 7581	-10 0500	2342		0.551 4123	-12 5736	1576		0.239 1267	-5 4522 682
	18	0.824 5739	9 8158	2368		0.538 6811	12 7312	1536		0.233 6063	5 5204 665
	19	0.834 1529	9 5790	2399		0.525 7963	12 8848	1496		0.228 0194	5 5869 650
	20	0.843 4920	9 3391	2424		0.512 7619	13.0344	1455		0.222 3675	5 6519 629
			9 0967				13 1799				5 7148
	21	-0.852 5887		+2450		+0.499 5820	-1415			+0.216 6527	-616
	22	0.861 4404	- 8 8517	2471		0.486 2606	-13 3214	1377		0.210 8763	-5 7764 598
	23	0.870 0450	8 6046	2495		0.472 8015	13 4591	1338		0.205 0401	5 8362 581
	24	0.878 4001	8 3551	2516		0.459 2086	13 5929	1300		0.199 1458	5 8943 566
	25	0.886 5036	8 1035	2536		0.445 4857	13 7229	1259		0.193 1949	5 9509 548
			7 8499				13 8488				6 0057
	26	-0.894 3535	- 7 5939	+2560		+0.431 6369	-13 9713	-1225		+0.187 1892	-6 0589 -532
	27	0.901 9474	7 3363	2576		0.417 6656	14 0898	1185		0.181 1303	-6 1103 514
	28	0.909 2837	7 0762	2601		0.403 5758	14 2048	1150		0.175 0200	-6 1605 502
	29	0.916 3599	6 8145	2617		0.389 3710	14 3158	1110		0.168 8595	-6 2087 482
	30	0.923 1744	6 5504	2641		0.375 0552	14 4235	1077		0.162 6508	-6 2555 468
Sept.	31	-0.929 7248	- 6 2846	+2658		+0.360 6317	-14 5269	-1034		+0.156 3953	-6 3005 -450
	1	0.936 0094	6 0163	2683		0.346 1048	14 6269	1000		0.150 0948	-6 3438 433
	2	0.942 0257	5 7464	2699		0.331 4779	14 7229	960		0.143 7510	-6 3855 417
	3	0.947 7721	5 4745	2719		0.316 7550	14 8149	920		0.137 3655	-6 4254 399
	4	0.953 2466	5 2002	2743		0.301 9401	14 9031	882		0.130 9401	-6 4634 380
	5	-0.958 4468	- 4 9246	+2756		+0.287 0370	-14 9870	- 839		+0.124 4767	-6 4998 -364
	6	0.963 3714	4 6468	2778		0.272 0500	15 0670	800		0.117 9769	-6 5345 347
	7	0.968 0182	4 3671	2797		0.256 9830	15 1426	756		0.111 4424	-6 5671 326
	8	0.972 3853	4 0855	2816		0.241 8404	15 2143	717		0.104 8753	-6 5979 308
	9	0.976 4708	3 8025	2830		0.226 6261	15 2814	671		0.098 2774	-6 6269 290
	10	-0.980 2733	- 3 5175	+2850		+0.211 3447	-15 3442	- 628		+0.091 6505	-6 6540 -271
	11	0.983 7908	3 2310	2865		0.196 0005	15 4021	579		0.084 9965	-6 6789 249
	12	0.987 0218	2 9428	2882		0.180 5984	15 4555	534		0.078 3176	-6 7021 232
	13	0.989 9646	2 6538	2890		0.165 1429	15 5039	484		0.071 6155	-6 7228 207
	14	0.992 6184	2 3630	2908		0.149 6390	15 5476	437		0.064 8927	-6 7417 189
	15	-0.994 9814	- 2 0720	+2910		+0.134 0914	-15 5864	- 388		+0.058 1510	-6 7584 -167
	16	0.997 0534	1 7800	2920		0.118 5050	15 6200	336		0.051 3926	-6 7732 148
	17	0.998 8334	1 4875	2925		0.102 8850	15 6489	289		0.044 6194	-6 7857 125
	18	1.000 3209	1 1948	2927		0.087 2361	15 6728	239		0.037 8337	-6 7962 105
	19	1.001 5157	9017	2931		0.071 5633	15 6921	193		0.031 0375	-6 8047 85
	20	-1.002 4174	- 6090	+2927		+0.055 8712	-15 7070	- 149		+0.024 2328	-6 8112 - 65
	21	1.003 0264	3157	2933		0.040 1642	15 7172	102		0.017 4216	-6 8158 46
	22	1.003 3421	- 227	2930		0.024 4470	15 7227	55		0.010 6058	-6 8183 25
	23	1.003 3648	+ 2702	2929		+0.008 7243	15 7242	- 15		+0.003 7875	-6 8191 - 8
	24	1.003 0946	5631	2929		-0.006 9999	15 7208	+ 34		-0.003 0316	-6 8180 + 11
	25	-1.002 5315	- 8560	+2929		-0.022 7207	-15 7135	+ 73		-0.009 8496	-6 8148 + 32
	26	1.001 6755	1 1486	2926		0.038 4342	15 7018	117		0.016 6644	-6 8099 49
	27	1.000 5269	1 4412	2926		0.054 1360	15 6857	161		0.023 4743	-6 8030 69
	28	0.999 0857	1 7338	2925		0.069 8217	15 6653	204		0.030 2773	-6 7941 89
	29	0.997 3519	2 0259	2921		0.085 4870	15 6404	249		0.037 0714	-6 7835 106
Oct.	30	-0.995 3260	+ 2 3178	+2919		-0.101 1274	-15 6114	+ 290		-0.043 8549	-6 7707 +128
	1	-0.993 0082	+2918			-0.116 7388	+ 335			-0.050 6256	+145

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Date		Mean Equator and Equinox of 1958.0											
		X				Y				Z			
Oct.	1	-0.993 0082			+2918	-0.116 7388			+ 335	-0.050 6256			+145
	2	0.990 3986	+ 2 6096		2914	0.132 3167	-15 5779		379	0.057 3818	-6 7562		166
	3	0.987 4976	2 9010		2912	0.147 8567	15 5400		427	0.064 1214	6 7396		184
	4	0.984 3054	3 1922		2905	0.163 3540	15 4973		466	0.070 8426	6 7212		205
	5	0.980 8227	3 4827		2903	0.178 8047	15 4507		515	0.077 5433	6 7007		225
			3 7730				15 3992				6 6782		
	6	-0.977 0497			+2897	-0.194 2039			+ 561	-0.084 2215			+244
	7	0.972 9870	+ 4 0627		2891	0.209 5470	-15 3431		605	0.090 8753	-6 6538		266
	8	0.968 6352	4 3518		2882	0.224 8296	15 2826		655	0.097 5025	6 6272		283
	9	0.963 9952	4 6400		2877	0.240 0467	15 2171		703	0.104 1014	6 5989		307
	10	0.959 0675	4 9277		2866	0.255 1935	15 1468		751	0.110 6696	6 5682		327
			5 2143				15 0717				6 5355		
	11	-0.953 8532			+2857	-0.270 2652			+ 800	-0.117 2051			+350
	12	0.948 3532	+ 5 5000		2839	0.285 2569	-14 9917		851	0.123 7056	-6 5005		367
	13	0.942 5693	5 7839		2827	0.300 1635	14 9066		900	0.130 1694	6 4638		391
	14	0.936 5027	6 0666		2808	0.314 9801	14 8166		949	0.136 5941	6 4247		412
	15	0.930 1553	6 3474		2788	0.329 7018	14 7217		1000	0.142 9776	6 3835		431
			6 6262				14 6217				6 3404		
	16	-0.923 5291			+2765	-0.344 3235			+1041	-0.149 3180			+452
	17	0.916 6264	+ 6 9027		2744	0.358 8411	-14 5176		1090	0.155 6132	-6 2952		470
	18	0.909 4493	7 1771		2722	0.373 2497	14 4086		1134	0.161 8614	6 2482		491
	19	0.902 0000	7 4493		2694	0.387 5449	14 2952		1176	0.168 0605	6 1991		508
	20	0.894 2813	7 7187		2671	0.401 7225	14 1776		1215	0.174 2088	6 1483		526
			7 9858				14 0561				6 0957		
	21	-0.886 2955			+2649	-0.415 7786			+1262	-0.180 3045			+544
	22	0.878 0448	+ 8 2507		2623	0.429 7085	-13 9299		1297	0.186 3458	-6 0413		562
	23	0.869 5318	8 5130		2599	0.443 5087	13 8002		1339	0.192 3309	5 9851		581
	24	0.860 7589	8 7729		2574	0.457 1750	13 6663		1377	0.198 2579	5 9270		595
	25	0.851 7286	9 0303		2550	0.470 7036	13 5286		1415	0.204 1254	5 8675		613
			9 2853				13 3871				5 8062		
	26	-0.842 4433			+2521	-0.484 0907			+1455	-0.209 9316			+632
	27	0.832 9059	+ 9 5374		2501	0.497 3323	-13 2416		1496	0.215 6746	-5 7430		648
	28	0.823 1184	9 7875		2469	0.510 4243	13 0920		1531	0.221 3528	5 6782		664
	29	0.813 0840	10 0344		2448	0.523 3632	12 9389		1569	0.226 9646	5 6118		681
	30	0.802 8048	10 2792		2419	0.536 1452	12 7820		1608	0.232 5083	5 5437		698
			10 5211				12 6212				5 4739		
Nov.	31	-0.792 2837			+2390	-0.548 7664			+1646	-0.237 9822			+715
	1	0.781 5236	+10 7601		2367	0.561 2230	-12 4566		1685	0.243 3846	-5 4024		734
	2	0.770 5268	10 9968		2336	0.573 5111	12 2881		1722	0.248 7136	5 3290		747
	3	0.759 2964	11 2304		2307	0.585 6270	12 1159		1762	0.253 9679	5 2543		766
	4	0.747 8353	11 4611		2278	0.597 5667	11 9397		1798	0.259 1456	5 1777		782
			11 6889				11 7599				5 0995		
	5	-0.736 1464			+2247	-0.609 3266			+1841	-0.264 2451			+798
	6	0.724 2328	+11 9136		2218	0.620 9024	-11 5758		1876	0.269 2648	-5 0197		816
	7	0.712 0974	12 1354		2179	0.632 2906	11 3882		1919	0.274 2029	4 9381		834
	8	0.699 7441	12 3533		2148	0.643 4869	11 1963		1959	0.279 0576	4 8547		850
	9	0.687 1760	12 5681		2111	0.654 4873	11 0004		1995	0.283 8273	4 7697		864
			12 7792				10 8009				4 6833		
	10	-0.674 3968			+2071	-0.665 2882			+2036	-0.288 5106			+884
	11	0.661 4105	+12 9863		2030	0.675 8855	-10 5973		2073	0.293 1055	-4 5949		897
	12	0.648 2212	13 1893		1988	0.686 2755	10 3900		2110	0.297 6107	4 5052		914
	13	0.634 8331	13 3881		1942	0.696 4545	10 1790		2142	0.302 0245	4 4138		930
14	0.621 2508	13 5823		1901	0.706 4193	9 9648		2176	0.306 3453	4 3208		939	
		13 7724				9 7472				4 2269			
15	-0.607 4784			+1853	-0.716 1665			+2205	-0.310 5722			+956	
16	-0.593 5207	+13 9577		+1808	-0.725 6932	- 9 5267		+2236	-0.314 7035	4 1313		+967	

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Date		Mean Equator and Equinox of 1958.0											
		X				Y				Z			
Nov.	16	-0.593	5207		+1808	-0.725	6932		+2236	-0.314	7035		+ 967
	17	0.579	3822	+14 1385	1764	0.734	9963	-9 3031	2262	0.318	7381	-4 0346	981
	18	0.565	0673	14 3149	1719	0.744	0732	9 0769	2288	0.322	6746	3 9365	991
	19	0.550	5805	14 4868	1672	0.752	9213	8 8481	2318	0.326	5120	3 8374	1003
	20	0.535	9265	14 6540	1631	0.761	5376	8 6163	2338	0.330	2491	3 7371	1013
				14 8171				8 3825				3 6358	
	21	-0.521	1094		+1584	-0.769	9201		+2363	-0.333	8849		+1024
	22	0.506	1339	+14 9755	1541	0.778	0663	-8 1462	2388	0.337	4183	-3 5334	1037
	23	0.491	0043	15 1296	1495	0.785	9737	7 9074	2410	0.340	8480	3 4297	1044
	24	0.475	7252	15 2791	1451	0.793	6401	7 6664	2433	0.344	1733	3 3253	1055
25	0.460	3010	15 4242	1406	0.801	0632	7 4231	2454	0.347	3931	3 2198	1065	
			15 5648				7 1777				3 1133		
26	-0.444	7362		+1362	-0.808	2409		+2478	-0.350	5064		+1076	
27	0.429	0352	+15 7010	1315	0.815	1708	-6 9299	2496	0.353	5121	-3 0057	1083	
28	0.413	2027	15 8325	1272	0.821	8511	6 6803	2520	0.356	4095	2 8974	1094	
29	0.397	2430	15 9597	1228	0.828	2794	6 4283	2539	0.359	1975	2 7880	1103	
30	0.381	1605	16 0825	1179	0.834	4538	6 1744	2560	0.361	8752	2 6777	1111	
			16 2004				5 9184				2 5666		
Dec.	1	-0.364	9601		+1135	-0.840	3722		+2580	-0.364	4418		+1122
	2	0.348	6462	+16 3139	1089	0.846	0326	-5 6604	2603	0.366	8962	-2 4544	1130
	3	0.332	2234	16 4228	1040	0.851	4327	5 4001	2619	0.369	2376	2 3414	1136
	4	0.315	6966	16 5268	992	0.856	5709	5 1282	2643	0.371	4654	2 2278	1148
	5	0.299	0706	16 6260	941	0.861	4448	4 8739	2663	0.373	5784	2 1130	1154
				16 7201				4 6076				1 9976	
	6	-0.282	3505		+ 893	-0.866	0524		+2683	-0.375	5760		+1166
	7	0.265	5411	+16 8094	839	0.870	3917	-4 3393	2697	0.377	4570	-1 8810	1168
	8	0.248	6478	16 8933	783	0.874	4613	4 0696	2719	0.379	2212	1 7642	1178
	9	0.231	6762	16 9716	727	0.878	2590	3 7977	2733	0.380	8676	1 6464	1186
	10	0.214	6319	17 0443	674	0.881	7834	3 5244	2748	0.382	3954	1 5278	1190
				17 1117				3 2496				1 4088	
	11	-0.197	5202		+ 615	-0.885	0330		+2760	-0.383	8042		+1195
	12	0.180	3470	+17 1732	556	0.888	0066	-2 9736	2770	0.385	0935	-1 2893	1201
	13	0.163	1182	17 2288	500	0.890	7032	2 6966	2778	0.386	2627	1 1692	+1202
	14	0.145	8394	17 2788	443	0.893	1220	2 4188	2785	0.387	3117	1 0490	1205
	15	0.128	5163	17 3231	388	0.895	2623	2 1403	2787	0.388	2402	9285	1209
				17 3619				1 8616				8076	
	16	-0.111	1544		+ 331	-0.897	1239		+2793	-0.389	0478		+1210
	17	0.093	7594	+17 3950	273	0.898	7062	-1 5823	2797	0.389	7344	- 6866	1211
	18	0.076	3371	17 4223	225	0.900	0088	1 3026	2797	0.390	2999	5655	1212
	19	0.058	8923	17 4448	166	0.901	0317	1 0229	2797	0.390	7442	4443	1213
	20	0.041	4309	17 4614	117	0.901	7749	7432	2796	0.391	0672	3230	1214
				17 4731				4636				2016	
	21	-0.023	9578		+ 62	-0.902	2385		+2798	-0.391	2688		+1214
	22	-0.006	4785	+17 4793	+ 7	0.902	4223	- 1838	2797	0.391	3490	- 802	1211
	23	+0.011	0015	17 4800	- 42	0.902	3264	+ 959	2794	0.391	3081	+ 409	1215
	24	0.028	4773	17 4758	94	0.901	9511	3753	2793	0.391	1457	1624	1211
	25	0.045	9437	17 4664	146	0.901	2965	6546	2788	0.390	8622	2835	1209
				17 4518				9334				4044	
	26	+0.063	3955		- 197	-0.900	3631		+2789	-0.390	4578		+1213
	27	0.080	8276	+17 4321	248	0.899	1508	+1 2123	2780	0.389	9321	+ 5257	1206
	28	0.098	2349	17 4073	297	0.897	6605	1 4903	2782	0.389	2858	6463	1208
	29	0.115	6125	17 3776	349	0.895	8920	1 7685	2774	0.388	5187	7671	1206
	30	0.132	9552	17 3427	401	0.893	8461	2 0459	2773	0.387	6310	8877	1202
				17 3026				2 3232				1 0079	
	31	+0.150	2578		- 451	-0.891	5229		+2769	-0.386	6231		+1203
	32	+0.167	5153	+17 2575	- 506	-0.888	9228	+2 6001	+2766	-0.385	4949	+1 1282	+1199

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Date		Mean Equator and Equinox of 1950.0									
		X _{1950.0}			Y _{1950.0}			Z _{1950.0}			
Jan.	0	+0.152 8612		- 489	-0.891 1549		+2770	-0.386 4650		+1201	
	1	0.170 1091	+17 2479	543	0.888 5029	+ 2 6520	2756	0.385 3156	+1 1494	1195	
	2	0.187 3027	17 1936	593	0.885 5753	2 9276	2744	0.384 0467	1 2689	1191	
	3	0.204 4370	17 1343	641	0.882 3733	3 2020	2733	0.382 6587	1 3880	1186	
	4	0.221 5072	17 0702	694	0.878 8980	3 4753	2721	0.381 1521	1 5066	1180	
			17 0008			3 7474			1 6246		
	5	+0.238 5080		- 741	-0.875 1506		+2708	-0.379 5275		+1177	
	6	0.255 4347	+16 9267	789	0.871 1324	+ 4 0182	2694	0.377 7852	+1 7423	1169	
			16 8478			4 2876			1 8592		
	7	0.272 2825		839	0.866 8448		2684	0.375 9260		1166	
			16 7639			4 5560			1 9758		
	8	0.289 0464	16 6752	887	0.862 2888	4 8233	2673	0.373 9502	2 0918	1160	
	9	0.305 7216	16 5817	935	0.857 4655	5 0892	2659	0.371 8584	2 2074	1156	
	10	+0.322 3033		- 986	-0.852 3763		+2647	-0.369 6510		+1149	
	11	0.338 7864	+16 4831	1036	0.847 0224	+ 5 3539	2635	0.367 3287	+2 3223	1142	
	12	0.355 1659	16 3795	1089	0.841 4050	5 6174	2621	0.364 8922	2 4365	1139	
			16 2706			5 8795			2 5504		
	13	0.371 4365	16 1567	1139	0.835 5255	6 1401	2606	0.362 3418	2 6634	1130	
	14	0.387 5932	16 0375	1192	0.829 3854	6 3988	2587	0.359 6784	2 7757	1123	
	15	+0.403 6307		-1246	-0.822 9866		+2574	-0.356 9027		+1115	
	16	0.419 5436	+15 9129	1297	0.816 3304	+ 6 6562	2550	0.354 0155	+2 8872	1106	
			15 7832			6 9112			2 9978		
	17	0.435 3268		1350	0.809 4192		2532	0.351 0177		1095	
			15 6482			7 1644			3 1073		
	18	0.450 9750	15 5080	1402	0.802 2548	7 4151	2507	0.347 9104	3 2159	1086	
	19	0.466 4830	15 3624	1456	0.794 8397	7 6636	2485	0.344 6945	3 3237	1078	
	20	+0.481 8454		-1502	-0.787 1761		+2456	-0.341 3708		+1062	
	21	0.497 0576	+15 2122	1554	0.779 2669	+ 7 9092	2430	0.337 9409	+3 4299	1053	
			15 0668			8 1522			3 5352		
	22	0.512 1144	14 8965	1603	0.771 1147	8 3924	2402	0.334 4057	3 6393	1041	
	23	0.527 0109	14 7316	1649	0.762 7223	8 6297	2373	0.330 7664	3 7419	1026	
	24	0.541 7425	14 5622	1694	0.754 0926	8 8639	2342	0.327 0245	3 8435	1016	
	25	+0.556 3047		-1740	-0.745 2287		+2310	-0.323 1810		+1001	
	26	0.570 6929	+14 3882	1783	0.736 1338	+ 9 0949	2280	0.319 2374	+3 9436	988	
			14 2099			9 3229			4 0424		
	27	0.584 9028		1827	0.726 8109		2247	0.315 1950		974	
			14 0272			9 5476			4 1398		
	28	0.598 9300	13 8404	1868	0.717 2633	9 7689	2213	0.311 0552	4 2358	960	
	29	0.612 7704	13 6498	1906	0.707 4944	9 9868	2179	0.306 8194	4 3303	945	
	30	+0.626 4202		-1949	-0.697 5076		+2149	-0.302 4891		+ 933	
	31	0.639 8751	+13 4549	1984	0.687 3059	+10 2017	2111	0.298 0655	+4 4236	916	
Feb.	1	0.653 1316	13 2565	2020	0.676 8931	10 4128	2077	0.293 5503	4 5152	902	
			13 0545			10 6205			4 6054		
	2	0.666 1861	12 8488	2057	0.666 2726	10 8248	2043	0.288 9449	4 6942	888	
	3	0.679 0349	12 6398	2090	0.655 4478	11 0259	2011	0.284 2507	4 7816	874	
	4	+0.691 6747		-2124	-0.644 4219		+1976	-0.279 4691		+ 858	
	5	0.704 1021	+12 4274	2161	0.633 1984	+11 2235	1947	0.274 6017	+4 8674	846	
			12 2113			11 4182			4 9520		
	6	0.716 3134		2192	0.621 7802		1912	0.269 6497		830	
			11 9921			11 6094			5 0350		
	7	0.728 3055	11 7694	2227	0.610 1708	11 7974	1880	0.264 6147	5 1166	816	
	8	0.740 0749	11 5430	2264	0.598 3734	11 9819	1845	0.259 4981	5 1969	803	
	9	+0.751 6179		-2300	-0.586 3915		+1815	-0.254 3012		+ 786	
	10	0.762 9309	+11 3130	2336	0.574 2281	+12 1634	1776	0.249 0257	+5 2755	770	
			11 0794			12 3410			5 3525		
	11	0.774 0103	10 8424	2370	0.561 8871	12 5154	1744	0.243 6732	5 4281	756	
	12	0.784 8527	10 6016	2408	0.549 3717	12 6857	1703	0.238 2451	5 5020	739	
	13	0.795 4543	10 3576	2440	0.536 6860	12 8522	1665	0.232 7431	5 5740	720	
	14	+0.805 8119		-2477	-0.523 8338		+1626	-0.227 1691		+ 703	
	15	+0.815 9218	+10 1099	-2508	-0.510 8190	+13 0148	+1581	-0.221 5248	+5 6443	+ 685	

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Date		Mean Equator and Equinox of 1950.0									
		X _{1950.0}			Y _{1950.0}			Z _{1950.0}			
Feb.	15	+0.815 9218		-2508	-0.510 8190		+1581	-0.221 5248		+685	
	16	0.825 7809	+9 8591	2542	0.497 6461	+13 1729	1542	0.215 8120	+5 7128	667	
	17	0.835 3858	9 6049	2570	0.484 3190	13 3271	1493	0.210 0325	5 7795	647	
	18	0.844 7337	9 3479	2600	0.470 8426	13 4764	1454	0.204 1883	5 8442	628	
	19	0.853 8216	9 0879	2631	0.457 2208	13 6218	1408	0.198 2813	5 9070	609	
			8 8248			13 7626			5 9679		
	20	+0.862 6464		-2653	-0.443 4582		+1360	-0.192 3134		+590	
	21	0.871 2059	+8 5595	2679	0.429 5596	+13 8986	1315	0.186 2865	+6 0269	569	
	22	0.879 4975	8 2916	2702	0.415 5295	14 0301	1268	0.180 2027	6 0838	549	
	23	0.887 5189	8 0214	2725	0.401 3726	14 1569	1221	0.174 0640	6 1387	530	
Mar.	24	0.895 2678	7 7489	2744	0.387 0936	14 2790	1175	0.167 8723	6 1917	508	
			7 4745			14 3965			6 2425		
	25	+0.902 7423		-2767	-0.372 6971		+1126	-0.161 6298		+491	
	26	0.909 9401	+7 1978	2780	0.358 1880	+14 5091	1081	0.155 3382	+6 2916	468	
	27	0.916 8599	6 9198	2799	0.343 5708	14 6172	1032	0.148 9998	6 3384	448	
	28	0.923 4998	6 6399	2814	0.328 8504	14 7204	985	0.142 6166	6 3832	430	
	1	0.929 8583	6 3585	2828	0.314 0315	14 8189	941	0.136 1904	6 4262	408	
			6 0757			14 9130			6 4670		
	2	+0.935 9340		-2836	-0.299 1185		+ 892	-0.129 7234		+389	
	3	0.941 7261	+5 7921	2852	0.284 1163	+15 0022	849	0.123 2175	+6 5059	369	
	4	0.947 2330	5 5069	2861	0.269 0292	15 0871	804	0.116 6747	6 5428	352	
	5	0.952 4538	5 2208	2871	0.253 8617	15 1675	764	0.110 0967	6 5780	331	
	6	0.957 3875	4 9337	2883	0.238 6178	15 2439	717	0.103 4856	6 6111	313	
			4 6454			15 3166			6 6424		
	7	+0.962 0329		-2894	-0.223 3022		+ 678	-0.096 8432		+295	
	8	0.966 3889	+4 3560	2908	0.207 9188	+15 3834	634	0.090 1713	+6 6719	276	
	9	0.970 4541	4 0652	2918	0.192 4720	15 4468	591	0.083 4718	6 6995	256	
	10	0.974 2275	3 7734	2931	0.176 9661	15 5059	547	0.076 7467	6 7251	237	
	11	0.977 7078	3 4803	2943	0.161 4055	15 5606	502	0.069 9979	6 7488	216	
			3 1860			15 6108			6 7704		
	12	+0.980 8938		-2954	-0.145 7947		+ 453	-0.063 2275		+196	
	13	0.983 7844	+2 8906	2962	0.130 1386	+15 6561	410	0.056 4375	+6 7900	176	
	14	0.986 3788	2 5944	2975	0.114 4415	15 6971	358	0.049 6299	6 8076	155	
	15	0.988 6757	2 2969	2979	0.098 7086	15 7329	312	0.042 8068	6 8231	132	
	16	0.990 6747	1 9990	2987	0.082 9445	15 7641	259	0.035 9705	6 8363	113	
			1 7003			15 7900			6 8476		
	17	+0.992 3750		-2992	-0.067 1545		+ 213	-0.029 1229		+ 89	
	18	0.993 7761	+1 4011	2995	0.051 3432	+15 8113	162	0.022 2664	+6 8565	69	
	19	0.994 8777	1 1016	2998	0.035 5157	15 8275	110	0.015 4030	6 8634	47	
	20	0.995 6795	8018	2995	0.019 6772	15 8385	61	0.008 5349	6 8681	26	
	21	0.996 1818	5023	2997	-0.003 8326	15 8446	+ 10	-0.001 6642	6 8707	+ 4	
			+ 2026			15 8456			6 8711		
	22	+0.996 3844		-2995	+0.012 0130		- 39	+0.005 2069		- 18	
	23	0.996 2875	- 969	2988	0.027 8547	+15 8417	92	0.012 0762	+6 8693	40	
	24	0.995 8918	3957	2986	0.043 6872	15 8325	137	0.018 9415	6 8653	58	
	25	0.995 1975	6943	2978	0.059 5060	15 8188	190	0.025 8010	6 8595	83	
	26	0.994 2054	9921	2969	0.075 3058	15 7998	236	0.032 6522	6 8512	101	
			1 2890			15 7762			6 8411		
	27	+0.992 9164		-2961	+0.091 0820		- 288	+0.039 4933		-124	
	28	0.991 3313	-1 5851	2949	0.106 8294	+15 7474	334	0.046 3220	+6 8287	142	
Apr.	29	0.989 4513	1 8800	2938	0.122 5434	15 7140	377	0.053 1365	6 8145	164	
	30	0.987 2775	2 1738	2924	0.138 2197	15 6763	428	0.059 9346	6 7981	183	
	31	0.984 8113	2 4662	2912	0.153 8532	15 6335	468	0.066 7144	6 7798	202	
			2 7574			15 5867			6 7596		
	1	+0.982 0539		-2897	+0.169 4399		- 513	+0.073 4740		-219	
	2	+0.979 0068	-3 0471	-2881	+0.184 9753	+15 5354	- 554	+0.080 2117	+6 7377	-240	

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Date		Mean Equator and Equinox of 1950.0									
		X _{1950.0}			Y _{1950.0}			Z _{1950.0}			
Apr.	1	+0.982 0539	-3 0471	-2897	+0.169 4399	+15 5354	-513	+0.073 4740	+6 7377	-219	
	2	0.979 0068	3 3352	2881	0.184 9753	15 4800	554	0.080 2117	6 7137	240	
	3	0.975 6716	3 6222	2870	0.200 4553	15 4206	594	0.086 9254	6 6881	256	
	4	0.972 0494	3 9080	2858	0.215 8759	15 3570	636	0.093 6135	6 6606	275	
	5	0.968 1414	4 1924	2844	0.231 2329	15 2895	675	0.100 2741	6 6312	294	
	6	+0.963 9490	-4 4757	-2833	+0.246 5224	+15 2178	-717	+0.106 9053	+6 6002	-310	
	7	0.959 4733	4 7579	2822	0.261 7402	15 1420	758	0.113 5055	6 5672	330	
	8	0.954 7154	5 0385	2806	0.276 8822	15 0619	801	0.120 0727	6 5324	348	
	9	0.949 6769	5 3182	2797	0.291 9441	14 9776	843	0.126 6051	6 4957	367	
	10	0.944 3587	5 5960	2778	0.306 9217	14 8886	890	0.133 1008	6 4570	387	
	11	+0.938 7627	-5 8727	-2767	+0.321 8103	+14 7957	-929	+0.139 5578	+6 4165	-405	
	12	0.932 8900	6 1477	2750	0.336 6060	14 6980	977	0.145 9743	6 3740	425	
	13	0.926 7423	6 4207	2730	0.351 3040	14 5960	1020	0.152 3483	6 3296	444	
	14	0.920 3216	6 6918	2711	0.365 9000	14 4895	1065	0.158 6779	6 2832	464	
	15	0.913 6298	6 9610	2692	0.380 3895	14 3784	1111	0.164 9611	6 2349	483	
	16	+0.906 6688	-7 2277	-2667	+0.394 7679	+14 2632	-1152	+0.171 1960	+6 1850	-499	
	17	0.899 4411	7 4924	2647	0.409 0311	14 1435	1197	0.177 3810	6 1329	521	
	18	0.891 9487	7 7544	2620	0.423 1746	14 0194	1241	0.183 5139	6 0791	538	
	19	0.884 1943	8 0138	2594	0.437 1940	13 8913	1281	0.189 5930	6 0234	557	
	20	0.876 1805	8 2707	2569	0.451 0853	13 7589	1324	0.195 6164	5 9661	573	
	21	+0.867 9098	-8 5248	-2541	+0.464 8442	+13 6221	-1368	+0.201 5825	+5 9068	-593	
	22	0.859 3850	8 7757	2509	0.478 4663	13 4815	1406	0.207 4893	5 8459	609	
	23	0.850 6093	9 0238	2481	0.491 9478	13 3369	1446	0.213 3352	5 7835	624	
	24	0.841 5855	9 2684	2446	0.505 2847	13.1884	1485	0.219 1187	5 7190	645	
	25	0.832 3171	9 5103	2419	0.518 4731	13 0362	1522	0.224 8377	5 6532	658	
	26	+0.822 8068	-9 7483	-2380	+0.531 5093	+12 8804	-1558	+0.230 4909	+5 5858	-674	
	27	0.813 0585	9 9832	2349	0.544 3897	12 7210	1594	0.236 0767	5 5170	688	
	28	0.803 0753	10 2147	2315	0.557 1107	12 5587	1623	0.241 5937	5 4466	704	
	29	0.792 8606	10 4427	2280	0.569 6694	12 3927	1660	0.247 0403	5 3750	716	
	30	0.782 4179	10 6674	2247	0.582 0621	12 2240	1687	0.252 4153	5 3018	732	
May	1	+0.771 7505	-10 8889	-2215	+0.594 2861	+12 0521	-1719	+0.257 7171	+5 2274	-744	
	2	0.760 8616	11 1071	2182	0.606 2382	11 8774	1747	0.262 9445	5 1515	759	
	3	0.749 7545	11 3220	2149	0.618 2156	11 6998	1776	0.268 0960	5 0746	769	
	4	0.738 4325	11 5340	2120	0.629 9154	11 5194	1804	0.273 1706	4 9961	785	
	5	0.726 8985	11 7429	2089	0.641 4348	11 3360	1834	0.278 1667	4 9168	793	
	6	+0.715 1556	-11 9487	-2058	+0.652 7708	+11 1492	-1868	+0.283 0835	+4 8355	-813	
	7	0.703 2069	12 1514	2027	0.663 9200	10 9597	1895	0.287 9190	4 7532	823	
	8	0.691 0555	12 3506	1992	0.674 8797	10 7670	1927	0.292 6722	4 6695	837	
	9	0.678 7049	12 5467	1961	0.685 6467	10 5712	1958	0.297 3417	4 5844	851	
	10	0.666 1582	12 7391	1924	0.696 2179	10 3721	1991	0.301 9261	4 4979	865	
	11	+0.653 4191	-12 9279	-1888	+0.706 5900	+10 1702	-2019	+0.306 4240	+4 4102	-877	
	12	0.640 4912	13 1132	1853	0.716 7602	9 9650	2052	0.310 8342	4 3211	891	
	13	0.627 3780	13 2946	1814	0.726 7252	9 7570	2080	0.315 1553	4 2308	903	
	14	0.614 0834	13 4719	1773	0.736 4822	9 5458	2112	0.319 3861	4 1390	918	
	15	0.600 6115	13 6456	1737	0.746 0280	9 3320	2138	0.323 5251	4 0463	927	
	16	+0.586 9659	-13 8147	-1691	+0.755 3600	+9 1151	-2169	+0.327 5714	+3 9523	-940	
	17	+0.573 1512		-1653	+0.764 4751		-2193	+0.331 5237		-951	

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Date		Mean Equator and Equinox of 1950.0									
		X _{1950.0}				Y _{1950.0}				Z _{1950.0}	
May	17	+0.573	1512		-1653	+0.764	4751		-2193	+0.331	5237
	18	0.559	1712	-13 9800	1610	0.773	3709	+8 8958	2222	0.335	3809
	19	0.545	0302	14 1410	1563	0.782	0445	8 6736	2246	0.339	1418
	20	0.530	7329	14 2973	1522	0.790	4935	8 4490	2272	0.342	8053
	21	0.516	2834	14 4495	1473	0.798	7153	8 2218	2293	0.346	3704
				14 5968				7 9925			
	22	+0.501	6866		-1429	+0.806	7078		-2317	+0.349	8361
	23	0.486	9469	-14 7397	1383	0.814	4686	+7 7608	2338	0.353	2015
	24	0.472	0689	14 8780	1334	0.821	9956	7 5270	2354	0.356	4658
	25	0.457	0575	15 0114	1291	0.829	2872	7 2916	2372	0.359	6282
	26	0.441	9170	15 1405	1240	0.836	3416	7 0544	2389	0.362	6877
				15 2645				6 8155			
	27	+0.426	6525		-1197	+0.843	1571		-2403	+0.365	6439
	28	0.411	2683	-15 3842	1152	0.849	7323	+6 5752	2416	0.368	4961
	29	0.395	7689	15 4994	1107	0.856	0659	6 3336	2428	0.371	2434
	30	0.380	1588	15 6101	1064	0.862	1567	6 0908	2441	0.373	8855
	31	0.364	4423	15 7165	1022	0.868	0034	5 8467	2455	0.376	4218
				15 8187				5 6012			
June	1	+0.348	6236		- 978	+0.873	6046		-2463	+0.378	8516
	2	0.332	7071	-15 9165	941	0.878	9595	+5 3549	2478	0.381	1745
	3	0.316	6965	16 0106	895	0.884	0666	5 1071	2491	0.383	3897
	4	0.300	5964	16 1001	855	0.888	9246	4 8580	2503	0.385	4969
	5	0.284	4108	16 1856	813	0.893	5323	4 6077	2516	0.387	4954
				16 2669				4 3561			
	6	+0.268	1439		- 769	+0.897	8884		-2530	+0.389	3846
	7	0.251	8001	-16 3438	725	0.901	9915	+4 1031	2545	0.391	1639
	8	0.235	3838	16 4163	679	0.905	8401	3 8486	2555	0.392	8327
	9	0.218	8996	16 4842	634	0.909	4332	3 5931	2569	0.394	3906
	10	0.202	3520	16 5476	587	0.912	7694	3 3362	2581	0.395	8368
				16 6063				3 0781			
	11	+0.185	7457		- 540	+0.915	8475		-2590	+0.397	1712
	12	0.169	0854	-16 6603	491	0.918	6666	+2 8191	2600	0.398	3932
	13	0.152	3760	16 7094	442	0.921	2257	2 5591	2608	0.399	5024
	14	0.135	6224	16 7536	395	0.923	5240	2 2983	2618	0.400	4985
	15	0.118	8293	16 7931	343	0.925	5605	2 0365	2626	0.401	3810
				16 8274				1 7739			
	16	+0.102	0019		- 295	+0.927	3344		-2629	+0.402	1497
	17	0.085	1450	-16 8569	242	0.928	8454	+1 5110	2637	0.402	8046
	18	0.068	2639	16 8811	192	0.930	0927	1 2473	2639	0.403	3452
	19	0.051	3636	16 9003	140	0.931	0761	9834	2640	0.403	7716
	20	0.034	4493	16 9143	87	0.931	7955	7194	2642	0.404	0835
				16 9230				4552			
	21	+0.017	5263		- 38	+0.932	2507		-2639	+0.404	2811
	22	+0.000	5995	-16 9268	+ 14	0.932	4420	+ 1913	2637	0.404	3644
	23	-0.016	3259	16 9254	61	0.932	3696	- 724	2633	0.404	3335
	24	0.033	2452	16 9193	112	0.932	0339	3357	2630	0.404	1885
	25	0.050	1533	16 9081	160	0.931	4352	5987	2618	0.403	9296
				16 8921				8605			
	26	-0.067	0454		+ 203	+0.930	5747		-2616	+0.403	5572
	27	0.083	9172	-16 8718	251	0.929	4526	-1 1221	2609	0.403	0714
	28	0.100	7639	16 8467	296	0.928	0696	1 3830	2598	0.402	4724
	29	0.117	5810	16 8171	335	0.926	4268	1 6428	2596	0.401	7606
	30	0.134	3646	16 7836	383	0.924	5244	1 9024	2588	0.400	9362
				16 7453				2 1612			
July	1	-0.151	1099		+ 424	+0.922	3632		-2581	+0.399	9993
	2	-0.167	8128	-16 7029	+ 466	+0.919	9439	-2 4193	-2572	+0.398	9505

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Date		Mean Equator and Equinox of 1950.0											
		X _{1950.0}				Y _{1950.0}				Z _{1950.0}			
July	1	-0.151 1099	-16 7029	+ 424		+0.922 3632	- 2 4193	-2581		+0.399 9993	-1 0488	-1119	
	2	0.167 8128	16 6563	466		0.919 9439	2 6765	2572		0.398 9505	1 1607	1119	
	3	0.184 4691	16 6051	512		0.917 2674	2 9337	2572		0.397 7898	1 2723	1116	
	4	0.201 0742	16 5497	554		0.914 3337	3 1901	2564		0.396 5175	1 3836	1113	
	5	0.217 6239	16 4897	600		0.911 1436	3 4458	2557		0.395 1339	1 4946	1110	
	6	-0.234 1136	-16 4252	+ 645		+0.907 6978	- 3 7008	-2550		+0.393 6393	-1 6054	-1108	
	7	0.250 5388	16 3562	690		0.903 9970	3 9553	2545		0.392 0339	1 7158	1104	
	8	0.266 8950	16 2824	738		0.900 0417	4 2088	2535		0.390 3181	1 8258	1100	
	9	0.283 1774	16 2042	782		0.895 8329	4 4613	2525		0.388 4923	1 9353	1095	
	10	0.299 3816	16 1211	831		0.891 3716	4 7129	2516		0.386 5570	2 0444	1091	
	11	-0.315 5027	-16 0335	+ 876		+0.886 6587	- 4 9635	-2506		+0.384 5126	-2 1531	-1087	
	12	0.331 5362	15 9410	925		0.881 6952	5 2131	2496		0.382 3595	2 2612	1081	
	13	0.347 4772	15 8438	972		0.876 4821	5 4611	2480		0.380 0983	2 3688	1076	
	14	0.363 3210	15 7420	1018		0.871 0210	5 7080	2469		0.377 7295	2 4756	1068	
	15	0.379 0630	15 6350	1070		0.865 3130	5 9533	2453		0.375 2539	2 5820	1064	
	16	-0.394 6980	-15 5236	+1114		+0.859 3597	- 6 1971	-2438		+0.372 6719	-2 6874	-1054	
	17	0.410 2216	15 4070	1166		0.853 1626	6 4389	2418		0.369 9845	2 7922	1048	
	18	0.425 6286	15 2860	1210		0.846 7237	6 6790	2401		0.367 1923	2 8961	1039	
	19	0.440 9146	15 1603	1257		0.840 0447	6 9167	2377		0.364 2962	2 9991	1030	
	20	0.456 0749	15 0299	1304		0.833 1280	7 1522	2355		0.361 2971	3 1011	1020	
	21	-0.471 1048	-14 8954	+1345		+0.825 9758	- 7 3854	-2332		+0.358 1960	-3 2020	-1009	
	22	0.486 0002	14 7563	1391		0.818 5904	7 6162	2308		0.354 9940	3 3022	1002	
	23	0.500 7565	14 6136	1427		0.810 9742	7 8443	2281		0.351 6918	3 4010	988	
	24	0.515 3701	14 4667	1469		0.803 1299	8 0703	2260		0.348 2908	3 4991	981	
	25	0.529 8368	14 3158	1509		0.795 0596	8 2936	2233		0.344 7917	3 5960	969	
	26	-0.544 1526	-14 1615	+1543		+0.786 7660	- 8 5142	-2206		+0.341 1957	-3 6918	- 958	
	27	0.558 3141	14 0033	1582		0.778 2518	8 7325	2183		0.337 5039	3 7865	947	
	28	0.572 3174	13 8414	1619		0.769 5193	8 9485	2160		0.333 7174	3 8803	938	
	29	0.586 1588	13 6763	1651		0.760 5708	9 1619	2134		0.329 8371	3 9732	929	
	30	0.599 8351	13 5074	1689		0.751 4089	9 3731	2112		0.325 8639	4 0648	916	
Aug.	31	-0.613 3425	-13 3348	+1726		+0.742 0358	- 9 5819	-2088		+0.321 7991	-4 1555	- 907	
	1	0.626 6773	13 1588	1760		0.732 4539	9 7881	2062		0.317 6436	4 2451	896	
	2	0.639 8361	12 9789	1799		0.722 6658	9 9923	2042		0.313 3985	4 3338	887	
	3	0.652 8150	12 7956	1833		0.712 6735	10 1938	2015		0.309 0647	4 4212	874	
	4	0.665 6106	12 6086	1870		0.702 4797	10 3929	1991		0.304 6435	4 5076	864	
	5	-0.678 2192	-12 4176	+1910		+0.692 0868	-10 5893	-1964		+0.300 1359	-4 5928	- 852	
	6	0.690 6368	12 2231	1945		0.681 4975	10 7830	1937		0.295 5431	4 6768	840	
	7	0.702 8599	12 0250	1981		0.670 7145	10 9743	1913		0.290 8663	4 7598	830	
	8	0.714 8849	11 8230	2020		0.659 7402	11 1625	1882		0.286 1065	4 8414	816	
	9	0.726 7079	11 6174	2056		0.648 5777	11 3479	1854		0.281 2651	4 9216	802	
	10	-0.738 3253	-11 4083	+2091		+0.637 2298	-11 5304	-1825		+0.276 3435	-5 0006	- 790	
	11	0.749 7336	11 1953	2130		0.625 6994	11 7096	1792		0.271 3429	5 0784	778	
	12	0.760 9289	10 9786	2167		0.613 9898	11 8858	1762		0.266 2645	5 1544	760	
	13	0.771 9075	10 7584	2202		0.602 1040	12 0587	1729		0.261 1101	5 2293	749	
	14	0.782 6659	10 5346	2238		0.590 0453	12 2282	1695		0.255 8808	5 3026	733	
	15	-0.793 2005	-10 3075	+2271		+0.577 8171	-12 3935	-1653		+0.250 5782	-5 3742	- 716	
	16	-0.803 5080	-10 0758	+2308		+0.565 4236	-12 5621	-1621		+0.245 2040	-5 4442	- 702	

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Date		Mean Equator and Equinox of 1950.0											
		X _{1950.0}				Y _{1950.0}				Z _{1950.0}			
Aug.	16	-0.803	5080		+2308	+0.565	4236		-1621	+0.245	2040		-702
	17	0.813	5847	-10 0767	2338	0.552	8680	-12 5556	1580	0.239	7596	-5 4444	684
	18	0.823	4276	9 8429	2366	0.540	1544	12 7136	1540	0.234	2468	5 5128	666
	19	0.833	0339	9 6063	2395	0.527	2868	12 8676	1501	0.228	6674	5 5794	652
	20	0.842	4007	9 3668	2421	0.514	2691	13 0177	1459	0.223	0228	5 6446	632
				9 1247				13 1636				5 7078	
	21	-0.851	5254		+2447	+0.501	1055		-1420	+0.217	3150		-617
	22	0.860	4054	-8 8800	2468	0.487	7999	-13 3056	1381	0.211	5455	-5 7695	600
	23	0.869	0386	8 6332	2492	0.474	3562	13 4437	1342	0.205	7160	5 8295	583
	24	0.877	4226	8 3840	2514	0.460	7783	13 5779	1305	0.199	8282	5 8878	567
25	0.885	5552	8 1326	2533	0.447	0699	13 7084	1263	0.193	8837	5 9445	551	
			7 8793				13 8347				5 9996		
	26	-0.893	4345		+2557	+0.433	2352		-1230	+0.187	8841		-534
	27	0.901	0581	-7 6236	2574	0.419	2775	-13 9577	1190	0.181	8311	-6 0530	516
	28	0.908	4243	7 3662	2598	0.405	2008	14 0767	1154	0.175	7265	6 1046	504
	29	0.915	5307	7 1064	2615	0.391	0087	14 1921	1115	0.169	5715	6 1550	484
	30	0.922	3756	6 8449	2639	0.376	7051	14 3036	1081	0.163	3681	6 2034	470
				6 5810				14 4117				6 2504	
Sept.	31	-0.928	9566		+2655	+0.362	2934		-1040	+0.157	1177		-452
	1	0.935	2721	-6 3155	2681	0.347	7777	-14 5157	1004	0.150	8221	-6 2956	435
	2	0.941	3195	6 0474	2697	0.333	1616	14 6161	965	0.144	4830	6 3391	419
	3	0.947	0972	5 7777	2718	0.318	4490	14 7126	925	0.138	1020	6 3810	401
	4	0.952	6031	5 5059	2740	0.303	6439	14 8051	886	0.131	6809	6 4211	383
				5 2319				14 8937				6 4594	
	5	-0.957	8350		+2755	+0.288	7502		-845	+0.125	2215		-366
	6	0.962	7914	-4 9564	2776	0.273	7720	-14 9782	805	0.118	7255	-6 4960	348
	7	0.967	4702	4 6788	2795	0.258	7133	15 0587	760	0.112	1947	6 5308	329
	8	0.971	8695	4 3993	2815	0.243	5786	15 1347	723	0.105	6310	6 5637	310
9	0.975	9873	4 1178	2828	0.228	3716	15 2070	676	0.099	0363	6 5947	293	
			3 8350				15 2746				6 6240		
	10	-0.979	8223		+2849	+0.213	0970		-632	+0.092	4123		-272
	11	0.983	3724	-3 5501	2864	0.197	7592	-15 3378	585	0.085	7611	-6 6512	252
	12	0.986	6361	3 2637	2880	0.182	3629	15 3963	539	0.079	0847	6 6764	234
	13	0.989	6118	2 9757	2890	0.166	9127	15 4502	490	0.072	3849	6 6998	209
	14	0.992	2985	2 6867	2906	0.151	4135	15 4992	442	0.065	6642	6 7207	192
				2 3961				15 5434				6 7399	
	15	-0.994	6946		+2910	+0.135	8701		-392	+0.058	9243		-169
	16	0.996	7997	-2 1051	2919	0.120	2875	-15 5826	342	0.052	1675	-6 7568	150
	17	0.998	6129	1 8132	2925	0.104	6707	15 6168	294	0.045	3957	6 7718	127
	18	1.000	1336	1 5207	2926	0.089	0245	15 6462	244	0.038	6112	6 7845	107
	19	1.001	3617	1 2281	2930	0.073	3539	15 6706	199	0.031	8160	6 7952	88
				9351				15 6905				6 8040	
	20	-1.002	2968		+2928	+0.057	6634		-154	+0.025	0120		-67
	21	1.002	9391	-6423	2932	0.041	9575	-15 7059	107	0.018	2013	-6 8107	49
	22	1.003	2882	3491	2929	0.026	2409	15 7166	60	0.011	3857	6 8156	27
	23	1.003	3444	562	2930	+0.010	5183	15 7226	-20	+0.004	5674	6 8183	-10
	24	1.003	1076	+2368	2929	-0.005	2063	15 7246	+28	-0.002	2519	6 8193	+9
				5297				15 7218				6 8184	
	25	-1.002	5779		+2929	-0.020	9281		+68	-0.009	0703		+30
	26	1.001	7553	+8226	2927	0.036	6431	-15 7150	111	0.015	8857	-6 8154	46
	27	1.000	6400	1 1153	2925	0.052	3470	15 7039	157	0.022	6965	6 8108	67
	28	0.999	2322	1 4078	2927	0.068	0352	15 6882	198	0.029	5006	6 8041	86
	29	0.997	5317	1 7005	2922	0.083	7036	15 6684	244	0.036	2961	6 7955	105
				1 9927				15 6440				6 7850	
Oct.	30	-0.995	5390		+2919	-0.099	3476		+285	-0.043	0811		+125
	1	-0.993	2544	+2 2846	+2919	-0.114	9631	-15 6155	+330	-0.049	8536	-6 7725	+143

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Date		Mean Equator and Equinox of 1950.0									
		X _{1950.0}			Y _{1950.0}			Z _{1950.0}			
Oct.	1	-0.993 2544		+2919	-0.114 9631		+ 330	-0.049 8536		+143	
	2	0.990 6779	+ 2 5765	2915	0.130 5456	-15 5825	373	0.056 6118	-6 7582	163	
	3	0.987 8099	2 8680	2912	0.146 0908	15 5452	422	0.063 3537	6 7419	183	
	4	0.984 6507	3 1592	2907	0.161 5938	15 5030	461	0.070 0773	6 7236	202	
	5	0.981 2008	3 4499	2903	0.177 0507	15 4569	510	0.076 7807	6 7034	223	
			3 7402			15 4059			6 6811		
	6	-0.977 4606		+2899	-0.192 4566		+ 556	-0.083 4618		+241	
	7	0.973 4305	+ 4 0301	2892	0.207 8069	-15 3503	600	0.090 1188	-6 6570	264	
	8	0.969 1112	4 3193	2884	0.223 0972	15 2903	649	0.096 7494	6 6306	281	
	9	0.964 5035	4 6077	2878	0.238 3226	15 2254	698	0.103 3519	6 6025	305	
	10	0.959 6080	4 8955	2868	0.253 4782	15 1556	746	0.109 9239	6 5720	325	
			5 1823			15 0810			6 5395		
	11	-0.954 4257		+2858	-0.268 5592		+ 795	-0.116 4634		+347	
	12	0.948 9576	+ 5 4681	2841	0.283 5607	-15 0015	846	0.122 9682	-6 5048	365	
	13	0.943 2054	5 7522	2829	0.298 4776	14 9169	895	0.129 4365	6 4683	389	
	14	0.937 1703	6 0351	2810	0.313 3050	14 8274	944	0.135 8659	6 4294	410	
	15	0.930 8542	6 3161	2790	0.328 0380	14 7330	994	0.142 2543	6 3884	429	
			6 5951			14 6336			6 3455		
	16	-0.924 2591		+2768	-0.342 6716		+1037	-0.148 5998		+449	
	17	0.917 3872	+ 6 8719	2745	0.357 2015	-14 5299	1085	0.154 9004	-6 3006	469	
	18	0.910 2408	7 1464	2725	0.371 6229	14 4214	1129	0.161 1541	6 2537	488	
	19	0.902 8219	7 4189	2697	0.385 9314	14 3085	1171	0.167 3590	6 2049	506	
	20	0.895 1333	7 6886	2673	0.400 1228	14 1914	1211	0.173 5133	6 1543	524	
			7 9559			14 0703			6 1019		
	21	-0.887 1774		+2652	-0.414 1931		+1257	-0.179 6152		+542	
	22	0.878 9563	+ 8 2211	2626	0.428 1377	-13 9446	1292	0.185 6629	-6 0477	560	
	23	0.870 4726	8 4837	2601	0.441 9531	13 8154	1334	0.191 6546	5 9917	579	
	24	0.861 7288	8 7438	2577	0.455 6351	13 6820	1373	0.197 5884	5 9338	593	
	25	0.852 7273	9 0015	2553	0.469 1798	13 5447	1410	0.203 4629	5 8745	611	
			9 2568			13 4037			5 8134		
	26	-0.843 4705		+2525	-0.482 5835		+1451	-0.209 2763		+630	
	27	0.833 9612	+ 9 5093	2503	0.495 8421	-13 2586	1491	0.215 0267	-5 7504	646	
	28	0.824 2016	9 7596	2473	0.508 9516	13 1095	1527	0.220 7125	5 6858	662	
	29	0.814 1947	10 0069	2451	0.521 9084	12 9568	1564	0.226 3321	5 6196	679	
	30	0.803 9427	10 2520	2423	0.534 7088	12 8004	1604	0.231 8838	5 5517	696	
			10 4943			12 6400			5 4821		
Nov.	31	-0.793 4484		+2393	-0.547 3488		+1642	-0.237 3659		+714	
	1	0.782 7148	+10 7336	2371	0.559 6246	-12 4758	1681	0.242 7766	-5 4107	731	
	2	0.771 7441	10 9707	2339	0.572 1323	12 3077	1717	0.248 1142	5 3376	746	
	3	0.760 5395	11 2046	2311	0.584 2683	12 1360	1759	0.253 3772	5 2630	764	
	4	0.749 1038	11 4357	2282	0.596 2284	11 9601	1793	0.258 5638	5 1866	780	
			11 6639			11 7808			5 1086		
	5	-0.737 4399		+2251	-0.608 0092		+1837	-0.263 6724		+797	
	6	0.725 5509	+11 8890	2221	0.619 6063	-11 5971	1872	0.268 7013	-5 0289	814	
	7	0.713 4398	12 1111	2184	0.631 0162	11 4099	1916	0.273 6488	4 9475	832	
	8	0.701 1103	12 3295	2152	0.642 2345	11 2183	1954	0.278 5131	4 8643	848	
	9	0.688 5656	12 5447	2116	0.653 2574	11 0229	1992	0.283 2926	4 7795	863	
			12 7563			10 8237			4 6932		
	10	-0.675 8093		+2074	-0.664 0811		+2032	-0.287 9858		+882	
	11	0.662 8456	+12 9637	2035	0.674 7016	-10 6205	2069	0.292 5908	-4 6050	896	
	12	0.649 6784	13 1672	1993	0.685 1152	10 4136	2107	0.297 1062	4 5154	912	
	13	0.636 3119	13 3665	1946	0.695 3181	10 2029	2138	0.301 5304	4 4242	928	
	14	0.622 7508	13 5611	1905	0.705 3072	9 9891	2173	0.305 8618	4 3314	938	
			13 7516			9 7718			4 2376		
	15	-0.608 9992		+1858	-0.715 0790		+2202	-0.310 0994		+955	
	16	-0.595 0618	+13 9374	+1813	-0.724 6306	- 9 5516	+2232	-0.314 2415	-4 1421	+965	

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Date		Mean Equator and Equinox of 1950.0									
		X _{1950.0}			Y _{1950.0}			Z _{1950.0}			
Nov.	16	-0.595 0618		+1813	-0.724 6306		+2232	-0.314 2415		+ 965	
	17	0.580 9431	+14 1187	1769	0.733 9590	-9 3284	2260	0.318 2871	-4 0456	980	
	18	0.566 6475	14 2956	1724	0.743 0614	9 1024	2284	0.322 2347	3 9476	989	
	19	0.552 1795	14 4680	1677	0.751 9354	8 8740	2315	0.326 0834	3 8487	1002	
	20	0.537 5438	14 6357	1635	0.760 5779	8 6425	2335	0.329 8319	3 7485	1012	
			14 7992			8 4090			3 6473		
	21	-0.522 7446		+1590	-0.768 9869		+2360	-0.333 4792		+1023	
	22	0.507 7864	+14 9582	1545	0.777 1599	-8 1730	2386	0.337 0242	-3 5450	1035	
	23	0.492 6737	15 1127	1501	0.785 0943	7 9344	2407	0.340 4657	3 4415	1043	
	24	0.477 4109	15 2628	1456	0.792 7880	7 6937	2430	0.343 8029	3 3372	1055	
	25	0.462 0025	15 4084	1411	0.800 2387	7 4507	2452	0.347 0346	3 2317	1063	
			15 5495			7 2055			3 1254		
	26	-0.446 4530		+1368	-0.807 4442		+2476	-0.350 1600		+1075	
	27	0.430 7667	+15 6863	1320	0.814 4021	-6 9579	2493	0.353 1779	-3 0179	1082	
	28	0.414 9484	15 8183	1277	0.821 1107	6 7086	2518	0.356 0876	2 9097	1093	
	29	0.399 0024	15 9460	1233	0.827 5675	6 4568	2536	0.358 8880	2 8004	1102	
	30	0.382 9331	16 0693	1185	0.833 7707	6 2032	2558	0.361 5782	2 6902	1110	
			16 1878			5 9474			2 5792		
Dec.	1	-0.366 7453		+1140	-0.839 7181		+2579	-0.364 1574		+1121	
	2	0.350 4435	+16 3018	1095	0.845 4076	-5 6895	2600	0.366 6245	-2 4671	1129	
	3	0.334 0322	16 4113	1046	0.850 8371	5 4295	2618	0.368 9787	2 3542	1136	
	4	0.317 5163	16 5159	997	0.856 0048	5 1677	2641	0.371 2193	2 2406	1147	
	5	0.300 9007	16 6156	947	0.860 9084	4 9036	2661	0.373 3452	2 1259	1153	
			16 7103			4 6375			2 0106		
	6	-0.284 1904		+ 898	-0.865 5459		+2681	-0.375 3558		+1165	
	7	0.267 3903	+16 8001	845	0.869 9153	-4 3694	2696	0.377 2499	-1 8941	1168	
	8	0.250 5057	16 8846	789	0.874 0151	4 0998	2718	0.379 0272	1 7773	1177	
	9	0.233 5422	16 9635	733	0.877 8431	3 8280	2731	0.380 6868	1 6596	1186	
	10	0.216 5054	17 0368	680	0.881 3980	3 5549	2747	0.382 2278	1 5410	1189	
			17 1048			3 2802			1 4221		
	11	-0.199 4006		+ 620	-0.884 6782		+2759	-0.383 6499		+1194	
	12	0.182 2338	+17 1668	563	0.887 6825	-3 0043	2769	0.384 9526	-1 3027	1201	
	13	0.165 0107	17 2231	505	0.890 4099	2 7274	2777	0.386 1352	1 1826	1202	
	14	0.147 7371	17 2736	449	0.892 8596	2 4497	2785	0.387 1976	1 0624	1204	
	15	0.130 4186	17 3185	394	0.895 0308	2 1712	2786	0.388 1396	9420	1209	
			17 3579			1 8926			8211		
	16	-0.113 0607		+ 337	-0.896 9234		+2792	-0.388 9607		+1210	
	17	0.095 6691	+17 3916	279	0.898 5368	-1 6134	2796	0.389 6608	- 7001	1211	
	18	0.078 2496	17 4195	231	0.899 8706	1 3338	2797	0.390 2398	5790	1211	
	19	0.060 8070	17 4426	172	0.900 9247	1 0541	2797	0.390 6977	4579	1214	
	20	0.043 3472	17 4598	123	0.901 6991	7744	2796	0.391 0342	3365	1213	
			17 4721			4948			2152		
	21	-0.025 8751		+ 67	-0.902 1939		+2797	-0.391 2494		+1214	
	22	-0.008 3963	+17 4788	+ 14	0.902 4090	- 2151	2797	0.391 3432	- 938	1211	
	23	+0.009 0839	17 4802	- 36	0.902 3444	+ 646	2795	0.391 3159	+ 273	1215	
	24	0.026 5605	17 4766	88	0.902 0003	3441	2793	0.391 1671	1488	1211	
	25	0.044 0283	17 4678	141	0.901 3769	6234	2788	0.390 8972	2699	1210	
			17 4537			9022			3909		
	26	+0.061 4820		- 191	-0.900 4747		+2789	-0.390 5063		+1212	
	27	0.078 9166	+17 4346	241	0.899 2936	+1 1811	2781	0.389 9942	+ 5121	1207	
	28	0.096 3271	17 4105	292	0.897 8344	1 4592	2782	0.389 3614	6328	1208	
	29	0.113 7084	17 3813	343	0.896 0970	1 7374	2775	0.388 6078	7536	1206	
	30	0.131 0554	17 3470	395	0.894 0821	2 0149	2773	0.387 7336	8742	1202	
			17 3075			2 2922			9944		
	31	+0.148 3629		- 445	-0.891 7899		+2771	-0.386 7392		+1204	
	32	+0.165 6259	+17 2630	- 500	-0.889 2206	+2 5693	+2766	-0.385 6244	+1 1148	+1199	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JANUARY 1									JANUARY 3								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	2	34	09.21	125.20	+14	54	34.1	+417.9	0	4	19	26.05	138.16	+19	02	03.3	+176.8
1	2	36	14.41	125.46	15	01	32.0	414.0	1	4	21	44.21	138.42	19	05	00.1	170.5
2	2	38	19.87	125.73	15	08	26.0	410.1	2	4	24	02.63	138.66	19	07	50.6	164.2
3	2	40	25.60	126.00	15	15	16.1	406.2	3	4	26	21.29	138.91	19	10	34.8	158.0
4	2	42	31.60	126.26	15	22	02.3	402.1	4	4	28	40.20	139.15	19	13	12.8	151.6
5	2	44	37.86	126.53	15	28	44.4	398.1	5	4	30	59.35	139.38	19	15	44.4	145.2
6	2	46	44.39	126.80	15	35	22.5	394.0	6	4	33	18.73	139.62	19	18	09.6	138.8
7	2	48	51.19	127.07	15	41	56.5	389.9	7	4	35	38.35	139.85	19	20	28.4	132.3
8	2	50	58.26	127.34	15	48	26.4	385.7	8	4	37	58.20	140.08	19	22	40.7	125.8
9	2	53	05.60	127.61	15	54	52.1	381.4	9	4	40	18.28	140.31	19	24	46.5	119.3
10	2	55	13.21	127.89	16	01	13.5	377.1	10	4	42	38.59	140.53	19	26	45.8	112.6
11	2	57	21.10	128.16	16	07	30.6	372.8	11	4	44	59.12	140.76	19	28	38.4	106.0
12	2	59	29.26	128.44	16	13	43.4	368.3	12	4	47	19.88	140.97	19	30	24.4	99.4
13	3	01	37.70	128.71	16	19	51.7	364.0	13	4	49	40.85	141.19	19	32	03.8	92.7
14	3	03	46.41	128.98	16	25	55.7	359.4	14	4	52	02.04	141.40	19	33	36.5	85.9
15	3	05	55.39	129.27	16	31	55.1	354.9	15	4	54	23.44	141.61	19	35	02.4	79.1
16	3	08	04.66	129.54	16	37	50.0	350.3	16	4	56	45.05	141.81	19	36	21.5	72.4
17	3	10	14.20	129.81	16	43	40.3	345.6	17	4	59	06.86	142.01	19	37	33.9	65.5
18	3	12	24.01	130.10	16	49	25.9	340.9	18	5	01	28.87	142.22	19	38	39.4	58.6
19	3	14	34.11	130.37	16	55	06.8	336.2	19	5	03	51.09	142.40	19	39	38.0	51.7
20	3	16	44.48	130.64	17	00	43.0	331.4	20	5	06	13.49	142.60	19	40	29.7	44.7
21	3	18	55.12	130.93	17	06	14.4	326.5	21	5	08	36.09	142.79	19	41	14.4	37.8
22	3	21	06.05	131.20	17	11	40.9	321.7	22	5	10	58.88	142.97	19	41	52.2	30.8
23	3	23	17.25	131.49	+17	17	02.6	+316.6	23	5	13	21.85	143.15	+19	42	23.0	+23.8
JANUARY 2									JANUARY 4								
0	3	25	28.74	131.76	+17	22	19.2	+311.7	0	5	15	45.00	143.32	+19	42	46.8	+16.7
1	3	27	40.50	132.03	17	27	30.9	306.6	1	5	18	08.32	143.50	19	43	03.5	9.6
2	3	29	52.53	132.32	17	32	37.5	301.5	2	5	20	31.82	143.67	19	43	13.1	+2.5
3	3	32	04.85	132.59	17	37	39.0	296.4	3	5	22	55.49	143.83	19	43	15.6	-4.7
4	3	34	17.44	132.87	17	42	35.4	291.1	4	5	25	19.32	143.99	19	43	10.9	11.8
5	3	36	30.31	133.14	17	47	26.5	285.9	5	5	27	43.31	144.14	19	42	59.1	19.0
6	3	38	43.45	133.41	17	52	12.4	280.6	6	5	30	07.45	144.30	19	42	40.1	26.2
7	3	40	56.86	133.70	17	56	53.0	275.2	7	5	32	31.75	144.45	19	42	13.9	33.4
8	3	43	10.56	133.96	18	01	28.2	269.8	8	5	34	56.20	144.58	19	41	40.5	40.6
9	3	45	24.52	134.24	18	05	58.0	264.4	9	5	37	20.78	144.73	19	40	59.9	47.9
10	3	47	38.76	134.51	18	10	22.4	258.9	10	5	39	45.51	144.86	19	40	12.0	55.2
11	3	49	53.27	134.78	18	14	41.3	253.3	11	5	42	10.37	144.99	19	39	16.8	62.5
12	3	52	08.05	135.05	18	18	54.6	247.7	12	5	44	35.36	145.12	19	38	14.3	69.8
13	3	54	23.10	135.32	18	23	02.3	242.0	13	5	47	00.48	145.24	19	37	04.5	77.2
14	3	56	38.42	135.58	18	27	04.3	236.4	14	5	49	25.72	145.35	19	35	47.3	84.5
15	3	58	54.00	135.86	18	31	00.7	230.6	15	5	51	51.07	145.47	19	34	22.8	91.8
16	4	01	09.86	136.11	18	34	51.3	224.8	16	5	54	16.54	145.58	19	32	51.0	99.2
17	4	03	25.97	136.38	18	38	36.1	218.9	17	5	56	42.12	145.67	19	31	11.8	106.5
18	4	05	42.35	136.64	18	42	15.0	213.1	18	5	59	07.79	145.78	19	29	25.3	114.0
19	4	07	58.99	136.90	18	45	48.1	207.1	19	6	01	33.57	145.87	19	27	31.3	121.3
20	4	10	15.89	137.16	18	49	15.2	201.1	20	6	03	59.44	145.96	19	25	30.0	128.7
21	4	12	33.05	137.41	18	52	36.3	195.1	21	6	06	25.40	146.05	19	23	21.3	136.1
22	4	14	50.46	137.67	18	55	51.4	189.1	22	6	08	51.45	146.12	19	21	05.2	143.5
23	4	17	08.13	137.92	18	59	00.5	+182.8	23	6	11	17.57	146.20	19	18	41.7	-150.8
24	4	19	26.05		+19	02	03.3		24	6	13	43.77		+19	16	10.9	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
JANUARY 5										JANUARY 7									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	6	13	43.77	146.27	+19	16	10.9	-158.3	0	8	10	44.47	144.76	+14	55	27.2	-488.1		
1	6	16	10.04	146.34	19	13	32.6	165.7	1	8	13	09.23	144.65	14	47	19.1	494.0		
2	6	18	36.38	146.40	19	10	46.9	173.1	2	8	15	33.88	144.54	14	39	05.1	499.8		
3	6	21	02.78	146.46	19	07	53.8	180.5	3	8	17	58.42	144.42	14	30	45.3	505.5		
4	6	23	29.24	146.51	19	04	53.3	187.8	4	8	20	22.84	144.30	14	22	19.8	511.1		
5	6	25	55.75	146.55	19	01	45.5	195.2	5	8	22	47.14	144.18	14	13	48.7	516.8		
6	6	28	22.30	146.61	18	58	30.3	202.6	6	8	25	11.32	144.06	14	05	11.9	522.3		
7	6	30	48.91	146.63	18	55	07.7	210.0	7	8	27	35.38	143.94	13	56	29.6	527.7		
8	6	33	15.54	146.68	18	51	37.7	217.3	8	8	29	59.32	143.81	13	47	41.9	533.2		
9	6	35	42.22	146.70	18	48	00.4	224.6	9	8	32	23.13	143.69	13	38	48.7	538.5		
10	6	38	08.92	146.73	18	44	15.8	232.0	10	8	34	46.82	143.56	13	29	50.2	543.9		
11	6	40	35.65	146.75	18	40	23.8	239.3	11	8	37	10.38	143.43	13	20	46.3	549.0		
12	6	43	02.40	146.76	18	36	24.5	246.6	12	8	39	33.81	143.30	13	11	37.3	554.2		
13	6	45	29.16	146.78	18	32	17.9	253.8	13	8	41	57.11	143.17	13	02	23.1	559.2		
14	6	47	55.94	146.78	18	28	04.1	261.1	14	8	44	20.28	143.03	12	53	03.9	564.3		
15	6	50	22.72	146.78	18	23	43.0	268.4	15	8	46	43.31	142.90	12	43	39.6	569.2		
16	6	52	49.50	146.79	18	19	14.6	275.6	16	8	49	06.21	142.77	12	34	10.4	574.0		
17	6	55	16.29	146.78	18	14	39.0	282.8	17	8	51	28.98	142.63	12	24	36.4	578.9		
18	6	57	43.07	146.76	18	09	56.2	290.0	18	8	53	51.61	142.50	12	14	57.5	583.6		
19	7	00	09.83	146.76	18	05	06.2	297.1	19	8	56	14.11	142.36	12	05	13.9	588.3		
20	7	02	36.59	146.73	18	00	09.1	304.2	20	8	58	36.47	142.22	11	55	25.6	592.8		
21	7	05	03.32	146.72	17	55	04.9	311.3	21	9	00	58.69	142.09	11	45	32.8	597.4		
22	7	07	30.04	146.68	17	49	53.6	318.4	22	9	03	20.78	141.95	11	35	35.4	601.8		
23	7	09	56.72	146.66	+17	44	35.2	-325.5	23	9	05	42.73	141.81	+11	25	33.6	-606.1		
JANUARY 6										JANUARY 8									
0	7	12	23.38	146.62	+17	39	09.7	-332.4	0	9	08	04.54	141.67	+11	15	27.5	-610.5		
1	7	14	50.00	146.58	17	33	37.3	339.4	1	9	10	26.21	141.53	11	05	17.0	614.6		
2	7	17	16.58	146.54	17	27	57.9	346.4	2	9	12	47.74	141.40	10	55	02.4	618.9		
3	7	19	43.12	146.49	17	22	11.5	353.3	3	9	15	09.14	141.25	10	44	43.5	622.8		
4	7	22	09.61	146.44	17	16	18.2	360.1	4	9	17	30.39	141.12	10	34	20.7	626.9		
5	7	24	36.05	146.39	17	10	18.1	367.0	5	9	19	51.51	140.98	10	23	53.8	630.8		
6	7	27	02.44	146.34	17	04	11.1	373.8	6	9	22	12.49	140.84	10	13	23.0	634.6		
7	7	29	28.78	146.27	16	57	57.3	380.5	7	9	24	33.33	140.70	10	02	48.4	638.4		
8	7	31	55.05	146.20	16	51	36.8	387.2	8	9	26	54.03	140.57	9	52	10.0	642.1		
9	7	34	21.25	146.14	16	45	09.6	393.9	9	9	29	14.60	140.43	9	41	27.9	645.6		
10	7	36	47.39	146.07	16	38	35.7	400.5	10	9	31	35.03	140.29	9	30	42.3	649.3		
11	7	39	13.46	145.99	16	31	55.2	407.1	11	9	33	55.32	140.16	9	19	53.0	652.6		
12	7	41	39.45	145.92	16	25	08.1	413.7	12	9	36	15.48	140.02	9	09	00.4	656.1		
13	7	44	05.37	145.83	16	18	14.4	420.1	13	9	38	35.50	139.88	8	58	04.3	659.3		
14	7	46	31.20	145.75	16	11	14.3	426.6	14	9	40	55.38	139.76	8	47	05.0	662.5		
15	7	48	56.95	145.67	16	04	07.7	432.9	15	9	43	15.14	139.61	8	36	02.5	665.7		
16	7	51	22.62	145.57	15	56	54.8	439.3	16	9	45	34.75	139.49	8	24	56.8	668.8		
17	7	53	48.19	145.48	15	49	35.5	445.6	17	9	47	54.24	139.36	8	13	48.0	671.7		
18	7	56	13.67	145.39	15	42	09.9	451.9	18	9	50	13.60	139.22	8	02	36.3	674.6		
19	7	58	39.06	145.29	15	34	38.0	458.0	19	9	52	32.82	139.10	7	51	21.7	677.5		
20	8	01	04.35	145.18	15	27	00.0	464.1	20	9	54	51.92	138.97	7	40	04.2	680.2		
21	8	03	29.53	145.09	15	19	15.9	470.3	21	9	57	10.89	138.84	7	28	44.0	682.8		
22	8	05	54.62	144.98	15	11	25.6	476.2	22	9	59	29.73	138.72	7	17	21.2	685.5		
23	8	08	19.60	144.87	15	03	29.4	-482.2	23	10	01	48.45	138.59	7	05	55.7	-687.9		
24	8	10	44.47		+14	55	27.2		24	10	04	07.04		+6	54	27.8			

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
JANUARY 9									JANUARY 11									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	10	04	07.04	138.47	+6	54	27.8	-690.4	0	11	53	10.21	134.95	-	2	39	16.5	-715.0
1	10	06	25.51	138.35	6	42	57.4	692.7	1	11	55	25.16	134.94	2	51	11.5	713.7	
2	10	08	43.86	138.23	6	31	24.7	695.0	2	11	57	40.10	134.92	3	03	05.2	712.2	
3	10	11	02.09	138.11	6	19	49.7	697.2	3	11	59	55.02	134.91	3	14	57.4	710.9	
4	10	13	20.20	138.00	6	08	12.5	699.2	4	12	02	09.93	134.90	3	26	48.3	709.2	
5	10	15	38.20	137.88	5	56	33.3	701.4	5	12	04	24.83	134.90	3	38	37.5	707.7	
6	10	17	56.08	137.77	5	44	51.9	703.2	6	12	06	39.73	134.90	3	50	25.2	706.0	
7	10	20	13.85	137.65	5	33	08.7	705.1	7	12	08	54.63	134.90	4	02	11.2	704.2	
8	10	22	31.50	137.55	5	21	23.6	706.9	8	12	11	09.53	134.89	4	13	55.4	702.5	
9	10	24	49.05	137.44	5	09	36.7	708.7	9	12	13	24.42	134.91	4	25	37.9	700.5	
10	10	27	06.49	137.33	4	57	48.0	710.2	10	12	15	39.33	134.91	4	37	18.4	698.6	
11	10	29	23.82	137.22	4	45	57.8	711.8	11	12	17	54.24	134.91	4	48	57.0	696.6	
12	10	31	41.04	137.13	4	34	06.0	713.3	12	12	20	09.15	134.93	5	00	33.6	694.5	
13	10	33	58.17	137.02	4	22	12.7	714.7	13	12	22	24.08	134.95	5	12	08.1	692.4	
14	10	36	15.19	136.93	4	10	18.0	716.0	14	12	24	39.03	134.96	5	23	40.5	690.1	
15	10	38	32.12	136.83	3	58	22.0	717.2	15	12	26	53.99	134.98	5	35	10.6	687.8	
16	10	40	48.95	136.74	3	46	24.8	718.4	16	12	29	08.97	135.00	5	46	38.4	685.5	
17	10	43	05.69	136.64	3	34	26.4	719.5	17	12	31	23.97	135.02	5	58	03.9	683.0	
18	10	45	22.33	136.55	3	22	26.9	720.4	18	12	33	38.99	135.05	6	09	26.9	680.6	
19	10	47	38.88	136.47	3	10	26.5	721.4	19	12	35	54.04	135.08	6	20	47.5	678.0	
20	10	49	55.35	136.38	2	58	25.1	722.2	20	12	38	09.12	135.10	6	32	05.5	675.4	
21	10	52	11.73	136.30	2	46	22.9	723.0	21	12	40	24.22	135.14	6	43	20.9	672.8	
22	10	54	28.03	136.21	2	34	19.9	723.7	22	12	42	39.36	135.17	6	54	33.7	669.9	
23	10	56	44.24	136.14	+2	22	16.2	-724.3	23	12	44	54.53	135.21	-	7	05	43.6	-667.2
JANUARY 10									JANUARY 12									
0	10	59	00.38	136.06	+2	10	11.9	-724.9	0	12	47	09.74	135.24	-	7	16	50.8	-664.3
1	11	01	16.44	135.99	1	58	07.0	725.2	1	12	49	24.98	135.29	7	27	55.1	661.4	
2	11	03	32.43	135.91	1	46	01.8	725.7	2	12	51	40.27	135.32	7	38	56.5	658.3	
3	11	05	48.34	135.85	1	33	56.1	726.0	3	12	53	55.59	135.37	7	49	54.8	655.4	
4	11	08	04.19	135.77	1	21	50.1	726.2	4	12	56	10.96	135.42	8	00	50.2	652.1	
5	11	10	19.96	135.71	1	09	43.9	726.3	5	12	58	26.38	135.46	8	11	42.3	649.0	
6	11	12	35.67	135.65	0	57	37.6	726.4	6	13	00	41.84	135.52	8	22	31.3	645.8	
7	11	14	51.32	135.59	0	45	31.2	726.5	7	13	02	57.36	135.56	8	33	17.1	642.4	
8	11	17	06.91	135.54	0	33	24.7	726.3	8	13	05	12.92	135.62	8	43	59.5	639.1	
9	11	19	22.45	135.47	0	21	18.4	726.2	9	13	07	28.54	135.67	8	54	38.6	635.6	
10	11	21	37.92	135.43	+0	09	12.2	725.9	10	13	09	44.21	135.73	9	05	14.2	632.1	
11	11	23	53.35	135.37	-0	02	53.7	725.7	11	13	11	59.94	135.79	9	15	46.3	628.6	
12	11	26	08.72	135.33	0	14	59.4	725.2	12	13	14	15.73	135.85	9	26	14.9	625.0	
13	11	28	24.05	135.28	0	27	04.6	724.9	13	13	16	31.58	135.91	9	36	39.9	621.3	
14	11	30	39.33	135.24	0	39	09.5	724.2	14	13	18	47.49	135.97	9	47	01.2	617.6	
15	11	32	54.57	135.20	0	51	13.7	723.7	15	13	21	03.46	136.04	9	57	18.8	613.7	
16	11	35	09.77	135.16	1	03	17.4	723.0	16	13	23	19.50	136.10	10	07	32.5	610.0	
17	11	37	24.93	135.13	1	15	20.4	722.3	17	13	25	35.60	136.17	10	17	42.5	606.0	
18	11	39	40.06	135.09	1	27	22.7	721.4	18	13	27	51.77	136.23	10	27	48.5	602.1	
19	11	41	55.15	135.06	1	39	24.1	720.6	19	13	30	08.00	136.31	10	37	50.6	598.0	
20	11	44	10.21	135.04	1	51	24.7	719.6	20	13	32	24.31	136.38	10	47	48.6	594.0	
21	11	46	25.25	135.01	2	03	24.3	718.5	21	13	34	40.69	136.45	10	57	42.6	589.8	
22	11	48	40.26	134.98	2	15	22.8	717.4	22	13	36	57.14	136.52	11	07	32.4	585.6	
23	11	50	55.24	134.97	2	27	20.2	-716.3	23	13	39	13.66	136.60	11	17	18.0	-581.4	
24	11	53	10.21		-2	39	16.5		24	13	41	30.26		-11	26	59.4		

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination											
JANUARY 13													JANUARY 15												
0	h	m	s	s	°	'	"	"	0	h	m	s	s	°	'	"	"								
0	13	41	30.26	136.67	-11	26	59.4	-577.1	0	15	32	20.82	140.31	-17	32	43.1	-315.4								
1	13	43	46.93	136.75	11	36	36.5	572.8	1	15	34	41.13	140.37	17	37	58.5	309.0								
2	13	46	03.68	136.83	11	46	09.3	568.3	2	15	37	01.50	140.42	17	43	07.5	302.6								
3	13	48	20.51	136.90	11	55	37.6	563.9	3	15	39	21.92	140.46	17	48	10.1	296.2								
4	13	50	37.41	136.98	12	05	01.5	559.3	4	15	41	42.38	140.51	17	53	06.3	289.7								
5	13	52	54.39	137.07	12	14	20.8	554.8	5	15	44	02.89	140.55	17	57	56.0	283.3								
6	13	55	11.46	137.14	12	23	35.6	550.2	6	15	46	23.44	140.59	18	02	39.3	276.7								
7	13	57	28.60	137.23	12	32	45.8	545.5	7	15	48	44.03	140.62	18	07	16.0	270.2								
8	13	59	45.83	137.30	12	41	51.3	540.8	8	15	51	04.65	140.66	18	11	46.2	263.7								
9	14	02	03.13	137.39	12	50	52.1	536.0	9	15	53	25.31	140.70	18	16	09.9	257.1								
10	14	04	20.52	137.47	12	59	48.1	531.2	10	15	55	46.01	140.72	18	20	27.0	250.6								
11	14	06	37.99	137.55	13	08	39.3	526.3	11	15	58	06.73	140.75	18	24	37.6	243.9								
12	14	08	55.54	137.64	13	17	25.6	521.3	12	16	00	27.48	140.78	18	28	41.5	237.3								
13	14	11	13.18	137.72	13	26	06.9	516.4	13	16	02	48.26	140.79	18	32	38.8	230.6								
14	14	13	30.90	137.81	13	34	43.3	511.4	14	16	05	09.05	140.82	18	36	29.4	224.0								
15	14	15	48.71	137.88	13	43	14.7	506.3	15	16	07	29.87	140.83	18	40	13.4	217.3								
16	14	18	06.59	137.98	13	51	41.0	501.2	16	16	09	50.70	140.85	18	43	50.7	210.6								
17	14	20	24.57	138.05	14	00	02.2	496.0	17	16	12	11.55	140.86	18	47	21.3	204.0								
18	14	22	42.62	138.14	14	08	18.2	490.8	18	16	14	32.41	140.86	18	50	45.3	197.2								
19	14	25	00.76	138.22	14	16	29.0	485.5	19	16	16	53.27	140.87	18	54	02.5	190.4								
20	14	27	18.98	138.31	14	24	34.5	480.2	20	16	19	14.14	140.88	18	57	12.9	183.7								
21	14	29	37.29	138.39	14	32	34.7	474.9	21	16	21	35.02	140.87	19	00	16.6	177.0								
22	14	31	55.68	138.48	14	40	29.6	469.5	22	16	23	55.89	140.87	19	03	13.6	170.2								
23	14	34	14.16	138.55	-14	48	19.1	-464.0	23	16	26	16.76	140.86	-19	06	03.8	-163.4								
JANUARY 14													JANUARY 16												
0	14	36	32.71	138.64	-14	56	03.1	-458.6	0	16	28	37.62	140.85	-19	08	47.2	-166.7								
1	14	38	51.35	138.72	15	03	41.7	453.0	1	16	30	58.47	140.84	19	11	23.9	149.8								
2	14	41	10.07	138.80	15	11	14.7	447.5	2	16	33	19.31	140.83	19	13	53.7	143.1								
3	14	43	28.87	138.89	15	18	42.2	441.8	3	16	35	40.14	140.80	19	16	16.8	136.2								
4	14	45	47.76	138.96	15	26	04.0	436.2	4	16	38	00.94	140.78	19	18	33.0	129.4								
5	14	48	06.72	139.04	15	33	20.2	430.5	5	16	40	21.72	140.76	19	20	42.4	122.7								
6	14	50	25.76	139.12	15	40	30.7	424.8	6	16	42	42.48	140.72	19	22	45.1	115.8								
7	14	52	44.88	139.20	15	47	35.5	419.0	7	16	45	03.20	140.70	19	24	40.9	109.0								
8	14	55	04.08	139.28	15	54	34.5	413.2	8	16	47	23.90	140.66	19	26	29.9	102.2								
9	14	57	23.36	139.35	16	01	27.7	407.3	9	16	49	44.56	140.62	19	28	12.1	95.3								
10	14	59	42.71	139.42	16	08	15.0	401.4	10	16	52	05.18	140.58	19	29	47.4	88.6								
11	15	02	02.13	139.50	16	14	56.4	395.6	11	16	54	25.76	140.53	19	31	16.0	81.7								
12	15	04	21.63	139.57	16	21	32.0	389.5	12	16	56	46.29	140.48	19	32	37.7	74.9								
13	15	06	41.20	139.64	16	28	01.5	383.5	13	16	59	06.77	140.43	19	33	52.6	68.1								
14	15	09	00.84	139.71	16	34	25.0	377.5	14	17	01	27.20	140.38	19	35	00.7	61.2								
15	15	11	20.55	139.78	16	40	42.5	371.5	15	17	03	47.58	140.32	19	36	01.9	54.5								
16	15	13	40.33	139.84	16	46	54.0	365.3	16	17	06	07.90	140.25	19	36	56.4	47.7								
17	15	16	00.17	139.91	16	52	59.3	359.2	17	17	08	28.15	140.19	19	37	44.1	40.8								
18	15	18	20.08	139.98	16	58	58.5	353.0	18	17	10	48.34	140.13	19	38	24.9	34.1								
19	15	20	40.06	140.03	17	04	51.5	346.9	19	17	13	08.47	140.04	19	38	59.0	27.4								
20	15	23	00.09	140.10	17	10	38.4	340.6	20	17	15	28.51	139.98	19	39	26.4	20.5								
21	15	25	20.19	140.15	17	16	19.0	334.3	21	17	17	48.49	139.89	19	39	46.9	13.9								
22	15	27	40.34	140.21	17	21	53.3	328.1	22	17	20	08.38	139.81	19	40	00.8	7.0								
23	15	30	00.55	140.27	17	27	21.4	-321.7	23	17	22	28.19	139.73	19	40	07.8	- 0.3								
24	15	32	20.82		-17	32	43.1		24	17	24	47.92		-19	40	08.1									

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JANUARY 17									JANUARY 19								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	17	24	47.92	139.64	-19	40	08.1	+ 6.3	0	19	13	54.46	132.00	-17	35	37.6	+299.0
1	17	27	07.56	139.54	19	40	01.8	13.1	1	19	16	06.46	131.79	17	30	38.6	304.2
2	17	29	27.10	139.45	19	39	48.7	19.8	2	19	18	18.25	131.58	17	25	34.4	309.3
3	17	31	46.55	139.35	19	39	28.9	26.5	3	19	20	29.83	131.37	17	20	25.1	314.5
4	17	34	05.90	139.25	19	39	02.4	33.1	4	19	22	41.20	131.15	17	15	10.6	319.6
5	17	36	25.15	139.14	19	38	29.3	39.8	5	19	24	52.35	130.93	17	09	51.0	324.6
6	17	38	44.29	139.03	19	37	49.5	46.4	6	19	27	03.28	130.72	17	04	26.4	329.6
7	17	41	03.32	138.92	19	37	03.1	53.0	7	19	29	14.00	130.50	16	58	56.8	334.5
8	17	43	22.24	138.81	19	36	10.1	59.6	8	19	31	24.50	130.29	16	53	22.3	339.4
9	17	45	41.05	138.69	19	35	10.5	66.1	9	19	33	34.79	130.06	16	47	42.9	344.3
10	17	47	59.74	138.56	19	34	04.4	72.7	10	19	35	44.85	129.84	16	41	58.6	349.1
11	17	50	18.30	138.45	19	32	51.7	79.2	11	19	37	54.69	129.63	16	36	09.5	353.8
12	17	52	36.75	138.31	19	31	32.5	85.8	12	19	40	04.32	129.40	16	30	15.7	358.6
13	17	54	55.06	138.18	19	30	06.7	92.2	13	19	42	13.72	129.18	16	24	17.1	363.2
14	17	57	13.24	138.05	19	28	34.5	98.7	14	19	44	22.90	128.96	16	18	13.9	367.8
15	17	59	31.29	137.92	19	26	55.8	105.1	15	19	46	31.86	128.74	16	12	06.1	372.4
16	18	01	49.21	137.77	19	25	10.7	111.5	16	19	48	40.60	128.51	16	05	53.7	377.0
17	18	04	06.98	137.63	19	23	19.2	117.9	17	19	50	49.11	128.29	15	59	36.7	381.4
18	18	06	24.61	137.49	19	21	21.3	124.2	18	19	52	57.40	128.07	15	53	15.3	385.8
19	18	08	42.10	137.33	19	19	17.1	130.5	19	19	55	05.47	127.84	15	46	49.5	390.2
20	18	10	59.43	137.19	19	17	06.6	136.9	20	19	57	13.31	127.62	15	40	19.3	394.5
21	18	13	16.62	137.03	19	14	49.7	143.1	21	19	59	20.93	127.39	15	33	44.8	398.9
22	18	15	33.65	136.88	19	12	26.6	149.3	22	20	01	28.32	127.17	15	27	05.9	403.0
23	18	17	50.53	136.71	-19	09	57.3	+155.6	23	20	03	35.49	126.95	-15	20	22.9	+407.2
JANUARY 18									JANUARY 20								
0	18	20	07.24	136.55	-19	07	21.7	+161.7	0	20	05	42.44	126.72	-15	13	35.7	+411.4
1	18	22	23.79	136.39	19	04	40.0	167.8	1	20	07	49.16	126.50	15	06	44.3	415.5
2	18	24	40.18	136.22	19	01	52.2	174.0	2	20	09	55.66	126.28	14	59	48.8	419.5
3	18	26	56.40	136.05	18	58	58.2	180.1	3	20	12	01.94	126.05	14	52	49.3	423.4
4	18	29	12.45	135.88	18	55	58.1	186.0	4	20	14	07.99	125.83	14	45	45.9	427.5
5	18	31	28.33	135.71	18	52	52.1	192.1	5	20	16	13.82	125.60	14	38	38.4	431.3
6	18	33	44.04	135.53	18	49	40.0	198.1	6	20	18	19.42	125.38	14	31	27.1	435.2
7	18	35	59.57	135.34	18	46	21.9	204.0	7	20	20	24.80	125.16	14	24	11.9	438.9
8	18	38	14.91	135.17	18	42	57.9	209.9	8	20	22	29.96	124.94	14	16	53.0	442.7
9	18	40	30.08	134.99	18	39	28.0	215.7	9	20	24	34.90	124.72	14	09	30.3	446.4
10	18	42	45.07	134.79	18	35	52.3	221.6	10	20	26	39.62	124.50	14	02	03.9	450.1
11	18	44	59.86	134.61	18	32	10.7	227.4	11	20	28	44.12	124.28	13	54	33.8	453.7
12	18	47	14.47	134.42	18	28	23.3	233.1	12	20	30	48.40	124.06	13	47	00.1	457.2
13	18	49	28.89	134.23	18	24	30.2	238.9	13	20	32	52.46	123.84	13	39	22.9	460.7
14	18	51	43.12	134.04	18	20	31.3	244.5	14	20	34	56.30	123.63	13	31	42.2	464.2
15	18	53	57.16	133.83	18	16	26.8	250.1	15	20	36	59.93	123.41	13	23	58.0	467.5
16	18	56	10.99	133.65	18	12	16.7	255.8	16	20	39	03.34	123.19	13	16	10.5	471.0
17	18	58	24.64	133.44	18	08	00.9	261.3	17	20	41	06.53	122.98	13	08	19.5	474.2
18	19	00	38.08	133.24	18	03	39.6	266.8	18	20	43	09.51	122.76	13	00	25.3	477.5
19	19	02	51.32	133.04	17	59	12.8	272.2	19	20	45	12.27	122.55	12	52	27.8	480.8
20	19	05	04.36	132.83	17	54	40.6	277.7	20	20	47	14.82	122.34	12	44	27.0	483.8
21	19	07	17.19	132.63	17	50	02.9	283.1	21	20	49	17.16	122.13	12	36	23.2	487.1
22	19	09	29.82	132.42	17	45	19.8	288.5	22	20	51	19.29	121.92	12	28	16.1	490.0
23	19	11	42.24	132.22	17	40	31.3	+293.7	23	20	53	21.21	121.72	12	20	06.1	+493.1
24	19	13	54.46		-17	35	37.6		24	20	55	22.93		-12	11	53.0	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JANUARY 21									JANUARY 23								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	20	55	22.93	121.50	-12	11	53.0	+496.1	0	22	29	13.06	113.71	-4	53	08.8	+586.0
1	20	57	24.43	121.30	12	03	36.9	499.0	1	22	31	06.77	113.60	4	43	22.8	586.9
2	20	59	25.73	121.10	11	55	17.9	501.9	2	22	33	00.37	113.49	4	33	35.9	587.7
3	21	01	26.83	120.89	11	46	56.0	504.7	3	22	34	53.86	113.40	4	23	48.2	588.4
4	21	03	27.72	120.69	11	38	31.3	507.5	4	22	36	47.26	113.29	4	13	59.8	589.2
5	21	05	28.41	120.49	11	30	03.8	510.2	5	22	38	40.55	113.20	4	04	10.6	589.9
6	21	07	28.90	120.30	11	21	33.6	512.9	6	22	40	33.75	113.11	3	54	20.7	590.5
7	21	09	29.20	120.10	11	13	00.7	515.6	7	22	42	26.86	113.01	3	44	30.2	591.2
8	21	11	29.30	119.90	11	04	25.1	518.2	8	22	44	19.87	112.92	3	34	39.0	591.8
9	21	13	29.20	119.70	10	55	46.9	520.7	9	22	46	12.79	112.84	3	24	47.2	592.3
10	21	15	28.90	119.52	10	47	06.2	523.2	10	22	48	05.63	112.75	3	14	54.9	592.8
11	21	17	28.42	119.32	10	38	23.0	525.7	11	22	49	58.38	112.67	3	05	02.1	593.3
12	21	19	27.74	119.14	10	29	37.3	528.1	12	22	51	51.05	112.60	2	55	08.8	593.8
13	21	21	26.88	118.95	10	20	49.2	530.4	13	22	53	43.65	112.52	2	45	15.0	594.1
14	21	23	25.83	118.76	10	11	58.8	532.8	14	22	55	36.17	112.44	2	35	20.9	594.6
15	21	25	24.59	118.58	10	03	06.0	535.0	15	22	57	28.61	112.37	2	25	26.3	594.8
16	21	27	23.17	118.40	9	54	11.0	537.3	16	22	59	20.98	112.31	2	15	31.5	595.2
17	21	29	21.57	118.22	9	45	13.7	539.5	17	23	01	13.29	112.25	2	05	36.3	595.4
18	21	31	19.79	118.04	9	36	14.2	541.6	18	23	03	05.54	112.18	1	55	40.9	595.7
19	21	33	17.83	117.86	9	27	12.6	543.7	19	23	04	57.72	112.12	1	45	45.2	595.8
20	21	35	15.69	117.69	9	18	08.9	545.8	20	23	06	49.84	112.06	1	35	49.4	596.0
21	21	37	13.38	117.52	9	09	03.1	547.7	21	23	08	41.90	112.02	1	25	53.4	596.1
22	21	39	10.90	117.35	8	59	55.4	549.8	22	23	10	33.92	111.96	1	15	57.3	596.2
23	21	41	08.25	117.18	- 8	50	45.6	+551.6	23	23	12	25.88	111.91	-1	06	01.1	+596.2
JANUARY 22									JANUARY 24								
0	21	43	05.43	117.01	- 8	41	34.0	+553.5	0	23	14	17.79	111.87	-0	56	04.9	+596.3
1	21	45	02.44	116.86	8	32	20.5	555.4	1	23	16	09.66	111.82	0	46	08.6	596.3
2	21	46	59.30	116.68	8	23	05.1	557.2	2	23	18	01.48	111.79	0	36	12.3	596.2
3	21	48	55.98	116.53	8	13	47.9	558.8	3	23	19	53.27	111.75	0	26	16.1	596.1
4	21	50	52.51	116.37	8	04	29.1	560.6	4	23	21	45.02	111.71	0	16	20.0	596.0
5	21	52	48.88	116.22	7	55	08.5	562.3	5	23	23	36.73	111.69	-0	06	24.0	595.8
6	21	54	45.10	116.06	7	45	46.2	563.9	6	23	25	28.42	111.65	+0	03	31.8	595.7
7	21	56	41.16	115.92	7	36	22.3	565.4	7	23	27	20.07	111.63	0	13	27.5	595.4
8	21	58	37.08	115.76	7	26	56.9	567.0	8	23	29	11.70	111.61	0	23	22.9	595.2
9	22	00	32.84	115.62	7	17	29.9	568.5	9	23	31	03.31	111.59	0	33	18.1	594.9
10	22	02	28.46	115.47	7	08	01.4	569.9	10	23	32	54.90	111.57	0	43	13.0	594.5
11	22	04	23.93	115.33	6	58	31.5	571.4	11	23	34	46.47	111.56	0	53	07.5	594.2
12	22	06	19.26	115.19	6	49	00.1	572.7	12	23	36	38.03	111.55	1	03	01.7	593.8
13	22	08	14.45	115.06	6	39	27.4	574.0	13	23	38	29.58	111.54	1	12	55.5	593.4
14	22	10	09.51	114.92	6	29	53.4	575.4	14	23	40	21.12	111.53	1	22	48.9	592.9
15	22	12	04.43	114.79	6	20	18.0	576.5	15	23	42	12.65	111.53	1	32	41.8	592.5
16	22	13	59.22	114.66	6	10	41.5	577.8	16	23	44	04.18	111.53	1	42	34.3	591.9
17	22	15	53.88	114.53	6	01	03.7	579.0	17	23	45	55.71	111.54	1	52	26.2	591.4
18	22	17	48.41	114.40	5	51	24.7	580.0	18	23	47	47.25	111.54	2	02	17.6	590.7
19	22	19	42.81	114.29	5	41	44.7	581.2	19	23	49	38.79	111.55	2	12	08.3	590.2
20	22	21	37.10	114.16	5	32	03.5	582.2	20	23	51	30.34	111.56	2	21	58.5	589.5
21	22	23	31.26	114.05	5	22	21.3	583.2	21	23	53	21.90	111.58	2	31	48.0	588.8
22	22	25	25.31	113.93	5	12	38.1	584.2	22	23	55	13.48	111.60	2	41	36.8	588.1
23	22	27	19.24	113.82	5	02	53.9	+585.1	23	23	57	05.08	111.61	2	51	24.9	+587.3
24	22	29	13.06		- 4	53	08.8		24	23	58	56.69		+3	01	12.2	

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JANUARY 25									JANUARY 27								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	23	58	56.69	111.64	+	3	01	12.2	+586.6	0	1	29	35.51	+10	25	42.1	+510.4
1	0	00	48.33	111.67		3	10	58.8	585.7	1	1	31	31.68	10	34	12.5	507.9
2	0	02	40.00	111.70		3	20	44.5	584.9	2	1	33	28.00	10	42	40.4	505.4
3	0	04	31.70	111.73		3	30	29.4	584.0	3	1	35	24.49	10	51	05.8	502.9
4	0	06	23.43	111.76		3	40	13.4	583.1	4	1	37	21.14	10	59	28.7	500.5
5	0	08	15.19	111.81		3	49	56.5	582.2	5	1	39	17.96	11	07	49.2	497.8
6	0	10	07.00	111.84		3	59	38.7	581.2	6	1	41	14.96	11	16	07.0	495.2
7	0	11	58.84	111.89		4	09	19.9	580.1	7	1	43	12.13	11	24	22.2	492.6
8	0	13	50.73	111.93		4	19	00.0	579.2	8	1	45	09.48	11	32	34.8	490.0
9	0	15	42.66	111.99		4	28	39.2	578.0	9	1	47	07.01	11	40	44.8	487.2
10	0	17	34.65	112.04		4	38	17.2	577.0	10	1	49	04.72	11	48	52.0	484.4
11	0	19	26.69	112.09		4	47	54.2	575.8	11	1	51	02.62	11	56	56.4	481.7
12	0	21	18.78	112.15		4	57	30.0	574.6	12	1	53	00.70	12	04	58.1	478.8
13	0	23	10.93	112.22		5	07	04.6	573.4	13	1	54	58.97	12	12	56.9	475.9
14	0	25	03.15	112.28		5	16	38.0	572.2	14	1	56	57.44	12	20	52.8	473.1
15	0	26	55.43	112.34		5	26	10.2	570.9	15	1	58	56.10	12	28	45.9	470.1
16	0	28	47.77	112.42		5	35	41.1	569.6	16	2	00	54.95	12	36	36.0	467.1
17	0	30	40.19	112.49		5	45	10.7	568.3	17	2	02	54.01	12	44	23.1	464.1
18	0	32	32.68	112.56		5	54	39.0	566.9	18	2	04	53.26	12	52	07.2	461.0
19	0	34	25.24	112.65		6	04	05.9	565.5	19	2	06	52.72	12	59	48.2	458.0
20	0	36	17.89	112.72		6	13	31.4	564.1	20	2	08	52.39	13	07	26.2	454.8
21	0	38	10.61	112.81		6	22	55.5	562.6	21	2	10	52.26	13	15	01.0	451.6
22	0	40	03.42	112.90		6	32	18.1	561.1	22	2	12	52.34	13	22	32.6	448.4
23	0	41	56.32	112.99	+	6	41	39.2	+559.6	23	2	14	52.64	+13	30	01.0	+445.1
JANUARY 26									JANUARY 28								
0	0	43	49.31	113.08	+	6	50	58.8	+558.0	0	2	16	53.14	+13	37	26.1	+441.8
1	0	45	42.39	113.18		7	00	16.8	556.4	1	2	18	53.87	13	44	47.9	438.5
2	0	47	35.57	113.28		7	09	33.2	554.8	2	2	20	54.81	13	52	06.4	435.2
3	0	49	28.85	113.38		7	18	48.0	553.2	3	2	22	55.98	13	59	21.6	431.6
4	0	51	22.23	113.48		7	28	01.2	551.4	4	2	24	57.36	14	06	33.2	428.3
5	0	53	15.71	113.59		7	37	12.6	549.7	5	2	26	58.97	14	13	41.5	424.7
6	0	55	09.30	113.70		7	46	22.3	547.9	6	2	29	00.81	14	20	46.2	421.2
7	0	57	03.00	113.82		7	55	30.2	546.1	7	2	31	02.87	14	27	47.4	417.6
8	0	58	56.82	113.93		8	04	36.3	544.4	8	2	33	05.17	14	34	45.0	413.9
9	1	00	50.75	114.05		8	13	40.7	542.4	9	2	35	07.69	14	41	38.9	410.3
10	1	02	44.80	114.17		8	22	43.1	540.5	10	2	37	10.45	14	48	29.2	406.6
11	1	04	38.97	114.30		8	31	43.6	538.6	11	2	39	13.45	14	55	15.8	402.8
12	1	06	33.27	114.42		8	40	42.2	536.7	12	2	41	16.68	15	01	58.6	399.0
13	1	08	27.69	114.55		8	49	38.9	534.6	13	2	43	20.15	15	08	37.6	395.2
14	1	10	22.24	114.69		8	58	33.5	532.6	14	2	45	23.86	15	15	12.8	391.3
15	1	12	16.93	114.82		9	07	26.1	530.5	15	2	47	27.81	15	21	44.1	387.3
16	1	14	11.75	114.96		9	16	16.6	528.5	16	2	49	32.00	15	28	11.4	383.4
17	1	16	06.71	115.10		9	25	05.1	526.2	17	2	51	36.44	15	34	34.8	379.4
18	1	18	01.81	115.24		9	33	51.3	524.1	18	2	53	41.13	15	40	54.2	375.3
19	1	19	57.05	115.39		9	42	35.4	521.9	19	2	55	46.06	15	47	09.5	371.3
20	1	21	52.44	115.54		9	51	17.3	519.7	20	2	57	51.24	15	53	20.8	367.0
21	1	23	47.98	115.69		9	59	57.0	517.4	21	2	59	56.67	15	59	27.8	362.9
22	1	25	43.67	115.84		10	08	34.4	515.0	22	3	02	02.36	16	05	30.7	358.7
23	1	27	39.51	116.00		10	17	09.4	512.7	23	3	04	08.29	16	11	29.4	354.4
24	1	29	35.51		+	10	25	42.1		24	3	06	14.48	+16	17	23.8	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination											
JANUARY 29													JANUARY 31												
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"								
0	3	06	14.48	126.44	+16	17	23.8	+350.0	0	4	52	17.73	138.77	+19	22	22.3	+90.0								
1	3	08	20.92	126.70	16	23	13.8	345.7	1	4	54	36.50	139.02	19	23	52.3	83.6								
2	3	10	27.62	126.96	16	28	59.5	341.3	2	4	56	55.52	139.24	19	25	15.9	77.1								
3	3	12	34.58	127.21	16	34	40.8	336.8	3	4	59	14.76	139.46	19	26	33.0	70.5								
4	3	14	41.79	127.47	16	40	17.6	332.3	4	5	01	34.22	139.70	19	27	43.5	64.0								
5	3	16	49.26	127.73	16	45	49.9	327.8	5	5	03	53.92	139.91	19	28	47.5	57.4								
6	3	18	56.99	128.00	16	51	17.7	323.2	6	5	06	13.83	140.14	19	29	44.9	50.7								
7	3	21	04.99	128.25	16	56	40.9	318.5	7	5	08	33.97	140.36	19	30	35.6	44.1								
8	3	23	13.24	128.51	17	01	59.4	313.9	8	5	10	54.33	140.56	19	31	19.7	37.3								
9	3	25	21.75	128.78	17	07	13.3	309.1	9	5	13	14.89	140.79	19	31	57.0	30.7								
10	3	27	30.53	129.03	17	12	22.4	304.4	10	5	15	35.68	140.99	19	32	27.7	23.8								
11	3	29	39.56	129.31	17	17	26.8	299.5	11	5	17	56.67	141.20	19	32	51.5	17.1								
12	3	31	48.87	129.56	17	22	26.3	294.7	12	5	20	17.87	141.40	19	33	08.6	10.2								
13	3	33	58.43	129.83	17	27	21.0	289.8	13	5	22	39.27	141.61	19	33	18.8	+3.4								
14	3	36	08.26	130.09	17	32	10.8	284.8	14	5	25	00.88	141.81	19	33	22.2	-3.6								
15	3	38	18.35	130.36	17	36	55.6	279.8	15	5	27	22.69	142.00	19	33	18.6	10.4								
16	3	40	28.71	130.62	17	41	35.4	274.8	16	5	29	44.69	142.19	19	33	08.2	17.4								
17	3	42	39.33	130.89	17	46	10.2	269.7	17	5	32	06.88	142.38	19	32	50.8	24.4								
18	3	44	50.22	131.15	17	50	39.9	264.5	18	5	34	29.26	142.57	19	32	26.4	31.3								
19	3	47	01.37	131.42	17	55	04.4	259.4	19	5	36	51.83	142.75	19	31	55.1	38.4								
20	3	49	12.79	131.68	17	59	23.8	254.1	20	5	39	14.58	142.93	19	31	16.7	45.4								
21	3	51	24.47	131.94	18	03	37.9	248.9	21	5	41	37.51	143.11	19	30	31.3	52.5								
22	3	53	36.41	132.21	18	07	46.8	243.5	22	5	44	00.62	143.28	19	29	38.8	59.6								
23	3	55	48.62	132.48	+18	11	50.3	+238.2	23	5	46	23.90	143.46	+19	28	39.2	-66.8								
JANUARY 30													FEBRUARY 1												
0	3	58	01.10	132.74	+18	15	48.5	+232.8	0	5	48	47.36	143.61	+19	27	32.4	-73.8								
1	4	00	13.84	133.00	18	19	41.3	227.4	1	5	51	10.97	143.78	19	26	18.6	81.0								
2	4	02	26.84	133.26	18	23	28.7	221.8	2	5	53	34.75	143.94	19	24	57.6	88.2								
3	4	04	40.10	133.53	18	27	10.5	216.3	3	5	55	58.69	144.10	19	23	29.4	95.4								
4	4	06	53.63	133.79	18	30	46.8	210.8	4	5	58	22.79	144.25	19	21	54.0	102.6								
5	4	09	07.42	134.04	18	34	17.6	205.1	5	6	00	47.04	144.39	19	20	11.4	109.8								
6	4	11	21.46	134.31	18	37	42.7	199.4	6	6	03	11.43	144.55	19	18	21.6	117.0								
7	4	13	35.77	134.57	18	41	02.1	193.7	7	6	05	35.98	144.68	19	16	24.6	124.3								
8	4	15	50.34	134.82	18	44	15.8	187.9	8	6	08	00.66	144.82	19	14	20.3	131.6								
9	4	18	05.16	135.09	18	47	23.7	182.2	9	6	10	25.48	144.95	19	12	08.7	138.8								
10	4	20	20.25	135.34	18	50	25.9	176.2	10	6	12	50.43	145.08	19	09	49.9	146.1								
11	4	22	35.59	135.59	18	53	22.1	170.4	11	6	15	15.51	145.21	19	07	23.8	153.5								
12	4	24	51.18	135.85	18	56	12.5	164.5	12	6	17	40.72	145.34	19	04	50.3	160.7								
13	4	27	07.03	136.10	18	58	57.0	158.5	13	6	20	06.06	145.45	19	02	09.6	168.0								
14	4	29	23.13	136.36	19	01	35.5	152.4	14	6	22	31.51	145.56	18	59	21.6	175.4								
15	4	31	39.49	136.60	19	04	07.9	146.4	15	6	24	57.07	145.68	18	56	26.2	182.7								
16	4	33	56.09	136.85	19	06	34.3	140.3	16	6	27	22.75	145.78	18	53	23.5	190.0								
17	4	36	12.94	137.10	19	08	54.6	134.1	17	6	29	48.53	145.89	18	50	13.5	197.3								
18	4	38	30.04	137.35	19	11	08.7	128.0	18	6	32	14.42	145.98	18	46	56.2	204.7								
19	4	40	47.39	137.58	19	13	16.7	121.7	19	6	34	40.40	146.08	18	43	31.5	212.0								
20	4	43	04.97	137.83	19	15	18.4	115.5	20	6	37	06.48	146.17	18	39	59.5	219.3								
21	4	45	22.80	138.07	19	17	13.9	109.2	21	6	39	32.65	146.26	18	36	20.2	226.6								
22	4	47	40.87	138.31	19	19	03.1	102.8	22	6	41	58.91	146.34	18	32	33.6	234.0								
23	4	49	59.18	138.55	19	20	45.9	+96.4	23	6	44	25.25	146.42	18	28	39.6	-241.2								
24	4	52	17.73		+19	22	22.3		24	6	46	51.67		+18	24	38.4									

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
FEBRUARY 2									FEBRUARY 4								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	6	46	51.67	146.49	+18	24	38.4	-248.6	0	8	44	21.18	146.03	+12	55	29.4	-565.8
1	6	49	18.16	146.57	18	20	29.8	255.9	1	8	46	47.21	145.95	12	46	03.6	571.3
2	6	51	44.73	146.63	18	16	13.9	263.2	2	8	49	13.16	145.87	12	36	32.3	576.6
3	6	54	11.36	146.70	18	11	50.7	270.4	3	8	51	39.03	145.79	12	26	55.7	581.8
4	6	56	38.06	146.75	18	07	20.3	277.7	4	8	54	04.82	145.72	12	17	13.9	587.1
5	6	59	04.81	146.82	18	02	42.6	285.0	5	8	56	30.54	145.63	12	07	26.8	592.1
6	7	01	31.63	146.86	17	57	57.6	292.2	6	8	58	56.17	145.55	11	57	34.7	597.2
7	7	03	58.49	146.91	17	53	05.4	299.4	7	9	01	21.72	145.47	11	47	37.5	602.2
8	7	06	25.40	146.96	17	48	06.0	306.6	8	9	03	47.19	145.38	11	37	35.3	607.1
9	7	08	52.36	146.99	17	42	59.4	313.8	9	9	06	12.57	145.30	11	27	28.2	611.9
10	7	11	19.35	147.04	17	37	45.6	321.0	10	9	08	37.87	145.20	11	17	16.3	616.6
11	7	13	46.39	147.06	17	32	24.6	328.1	11	9	11	03.07	145.12	11	06	59.7	621.4
12	7	16	13.45	147.10	17	26	56.5	335.3	12	9	13	28.19	145.03	10	56	38.3	625.9
13	7	18	40.55	147.12	17	21	21.2	342.4	13	9	15	53.22	144.94	10	46	12.4	630.4
14	7	21	07.67	147.14	17	15	38.8	349.4	14	9	18	18.16	144.85	10	35	42.0	634.9
15	7	23	34.81	147.16	17	09	49.4	356.5	15	9	20	43.01	144.76	10	25	07.1	639.3
16	7	26	01.97	147.17	17	03	52.9	363.6	16	9	23	07.77	144.67	10	14	27.8	643.5
17	7	28	29.14	147.19	16	57	49.3	370.5	17	9	25	32.44	144.57	10	03	44.3	647.7
18	7	30	56.33	147.19	16	51	38.8	377.4	18	9	27	57.01	144.48	9	52	56.6	651.9
19	7	33	23.52	147.20	16	45	21.4	384.4	19	9	30	21.49	144.39	9	42	04.7	655.9
20	7	35	50.72	147.19	16	38	57.0	391.3	20	9	32	45.88	144.29	9	31	08.8	659.8
21	7	38	17.91	147.20	16	32	25.7	398.2	21	9	35	10.17	144.20	9	20	09.0	663.7
22	7	40	45.11	147.19	16	25	47.5	405.0	22	9	37	34.37	144.10	9	09	05.3	667.5
23	7	43	12.30	147.17	+16	19	02.5	-411.7	23	9	39	58.47	144.01	+ 8	57	57.8	-671.2
FEBRUARY 3									FEBRUARY 5								
0	7	45	39.47	147.17	+16	12	10.8	-418.6	0	9	42	22.48	143.92	+ 8	46	46.6	-674.8
1	7	48	06.64	147.15	16	05	12.2	425.2	1	9	44	46.40	143.82	8	35	31.8	678.3
2	7	50	33.79	147.12	15	58	07.0	431.9	2	9	47	10.22	143.72	8	24	13.5	681.8
3	7	53	00.91	147.11	15	50	55.1	438.6	3	9	49	33.94	143.63	8	12	51.7	685.1
4	7	55	28.02	147.08	15	43	36.5	445.1	4	9	51	57.57	143.53	8	01	26.6	688.4
5	7	57	55.10	147.06	15	36	11.4	451.7	5	9	54	21.10	143.44	7	49	58.2	691.6
6	8	00	22.16	147.02	15	28	39.7	458.1	6	9	56	44.54	143.35	7	38	26.6	694.6
7	8	02	49.18	146.98	15	21	01.6	464.6	7	9	59	07.89	143.25	7	26	52.0	697.7
8	8	05	16.16	146.95	15	13	17.0	471.0	8	10	01	31.14	143.16	7	15	14.3	700.6
9	8	07	43.11	146.92	15	05	26.0	477.4	9	10	03	54.30	143.07	7	03	33.7	703.5
10	8	10	10.03	146.86	14	57	28.6	483.7	10	10	06	17.37	142.97	6	51	50.2	706.1
11	8	12	36.89	146.83	14	49	24.9	489.9	11	10	08	40.34	142.88	6	40	04.1	708.8
12	8	15	03.72	146.77	14	41	15.0	496.1	12	10	11	03.22	142.78	6	28	15.3	711.4
13	8	17	30.49	146.72	14	32	58.9	502.2	13	10	13	26.00	142.70	6	16	23.9	713.9
14	8	19	57.21	146.68	14	24	36.7	508.3	14	10	15	48.70	142.61	6	04	30.0	716.2
15	8	22	23.89	146.61	14	16	08.4	514.4	15	10	18	11.31	142.51	5	52	33.8	718.6
16	8	24	50.50	146.56	14	07	34.0	520.3	16	10	20	33.82	142.43	5	40	35.2	720.7
17	8	27	17.06	146.50	13	58	53.7	526.2	17	10	22	56.25	142.34	5	28	34.5	722.8
18	8	29	43.56	146.44	13	50	07.5	532.1	18	10	25	18.59	142.25	5	16	31.7	724.9
19	8	32	10.00	146.37	13	41	15.4	537.9	19	10	27	40.84	142.17	5	04	26.8	726.8
20	8	34	36.37	146.31	13	32	17.5	543.6	20	10	30	03.01	142.08	4	52	20.0	728.6
21	8	37	02.68	146.24	13	23	13.9	549.2	21	10	32	25.09	141.99	4	40	11.4	730.4
22	8	39	28.92	146.17	13	14	04.7	554.9	22	10	34	47.08	141.91	4	28	01.0	732.0
23	8	41	55.09	146.09	13	04	49.8	-560.4	23	10	37	08.99	141.83	4	15	49.0	-733.6
24	8	44	21.18		+12	55	29.4		24	10	39	30.82		+ 4	03	35.4	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination						
FEBRUARY 6									FEBRUARY 8											
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"			
0	10	39	30.82	141.75	+1	03	35.4	-735.1	0	12	31	49.12	139.58	-	5	44	32.5	-701.5		
1	10	41	52.57	141.67		3	51	20.3	736.4	1	12	34	08.70	139.57		5	56	14.0	698.7	
2	10	44	14.24	141.59		3	39	03.9	737.7	2	12	36	28.27	139.57		6	07	52.7	695.9	
3	10	46	35.83	141.51		3	26	46.2	738.9	3	12	38	47.84	139.56		6	19	28.6	693.1	
4	10	48	57.34	141.43		3	14	27.3	740.1	4	12	41	07.40	139.57		6	31	01.7	690.1	
5	10	51	18.77	141.36		3	02	07.2	741.0	5	12	43	26.97	139.56		6	42	31.8	687.1	
6	10	53	40.13	141.29		2	49	46.2	742.0	6	12	45	46.53	139.56		6	53	58.9	683.9	
7	10	56	01.42	141.21		2	37	24.2	742.8	7	12	48	06.09	139.56		7	05	22.8	680.9	
8	10	58	22.63	141.14		2	25	01.4	743.5	8	12	50	25.65	139.57		7	16	43.7	677.5	
9	11	00	43.77	141.07		2	12	37.9	744.2	9	12	52	45.22	139.57		7	28	01.2	674.3	
10	11	03	04.84	141.00		2	00	13.7	744.7	10	12	55	04.79	139.58		7	39	15.5	670.9	
11	11	05	25.84	140.94		1	47	49.0	745.2	11	12	57	24.37	139.59		7	50	26.4	667.4	
12	11	07	46.78	140.87		1	35	23.8	745.6	12	12	59	43.96	139.60		8	01	33.8	663.9	
13	11	10	07.65	140.80		1	22	58.2	745.9	13	13	02	03.56	139.60		8	12	37.7	660.3	
14	11	12	28.45	140.75		1	10	32.3	746.1	14	13	04	23.16	139.62		8	23	38.0	656.6	
15	11	14	49.20	140.68		0	58	06.2	746.1	15	13	06	42.78	139.62		8	34	34.6	653.0	
16	11	17	09.88	140.62		0	45	40.1	746.2	16	13	09	02.40	139.64		8	45	27.6	649.1	
17	11	19	30.50	140.57		0	33	13.9	746.2	17	13	11	22.04	139.66		8	56	16.7	645.3	
18	11	21	51.07	140.50		0	20	47.7	745.9	18	13	13	41.70	139.67		9	07	02.0	641.4	
19	11	24	11.57	140.46		+0	08	21.8	745.7	19	13	16	01.37	139.69		9	17	43.4	637.4	
20	11	26	32.03	140.40		-0	04	03.9	745.4	20	13	18	21.06	139.70		9	28	20.8	633.4	
21	11	28	52.43	140.34		0	16	29.3	745.0	21	13	20	40.76	139.72		9	38	54.2	629.2	
22	11	31	12.77	140.30		0	28	54.3	744.4	22	13	23	00.48	139.74		9	49	23.4	625.1	
23	11	33	33.07	140.25		-0	41	18.7	-743.8	23	13	25	20.22	139.76		-	9	59	48.5	-620.8
FEBRUARY 7									FEBRUARY 9											
0	11	35	53.32	140.20		-0	53	42.5	-743.2	0	13	27	39.98	139.78		-10	10	09.3	-616.6	
1	11	38	13.52	140.16		1	06	05.7	742.3	1	13	29	59.76	139.80		10	20	25.9	612.2	
2	11	40	33.68	140.12		1	18	28.0	741.5	2	13	32	19.56	139.83		10	30	38.1	607.8	
3	11	42	53.80	140.07		1	30	49.5	740.6	3	13	34	39.39	139.84		10	40	45.9	603.3	
4	11	45	13.87	140.03		1	43	10.1	739.5	4	13	36	59.23	139.87		10	50	49.2	598.8	
5	11	47	33.90	140.00		1	55	29.6	738.3	5	13	39	19.10	139.90		11	00	48.0	594.2	
6	11	49	53.90	139.95		2	07	47.9	737.2	6	13	41	39.00	139.91		11	10	42.2	589.6	
7	11	52	13.85	139.93		2	20	05.1	735.9	7	13	43	58.91	139.95		11	20	31.8	584.9	
8	11	54	33.78	139.88		2	32	21.0	734.5	8	13	46	18.86	139.96		11	30	16.7	580.1	
9	11	56	53.66	139.86		2	44	35.5	733.1	9	13	48	38.82	140.00		11	39	56.8	575.3	
10	11	59	13.52	139.83		2	56	48.6	731.5	10	13	50	58.82	140.02		11	49	32.1	570.5	
11	12	01	33.35	139.80		3	09	00.1	729.9	11	13	53	18.84	140.04		11	59	02.6	565.5	
12	12	03	53.15	139.77		3	21	10.0	728.2	12	13	55	38.88	140.07		12	08	28.1	560.6	
13	12	06	12.92	139.75		3	33	18.2	726.4	13	13	57	58.95	140.10		12	17	48.7	555.6	
14	12	08	32.67	139.72		3	45	24.6	724.5	14	14	00	19.05	140.13		12	27	04.3	550.5	
15	12	10	52.39	139.71		3	57	29.1	722.6	15	14	02	39.18	140.15		12	36	14.8	545.4	
16	12	13	12.10	139.68		4	09	31.7	720.5	16	14	04	59.33	140.18		12	45	20.2	540.2	
17	12	15	31.78	139.66		4	21	32.2	718.4	17	14	07	19.51	140.21		12	54	20.4	535.0	
18	12	17	51.44	139.65		4	33	30.6	716.3	18	14	09	39.72	140.24		13	03	15.4	529.8	
19	12	20	11.09	139.63		4	45	26.9	714.0	19	14	11	59.96	140.26		13	12	05.2	524.4	
20	12	22	30.72	139.62		4	57	20.9	711.6	20	14	14	20.22	140.29		13	20	49.6	519.1	
21	12	24	50.34	139.60		5	09	12.5	709.2	21	14	16	40.51	140.31		13	29	28.7	513.7	
22	12	27	09.94	139.60		5	21	01.7	706.7	22	14	19	00.82	140.35		13	38	02.4	508.3	
23	12	29	29.54	139.58		5	32	48.4	-704.1	23	14	21	21.17	140.36		13	46	30.7	-502.7	
24	12	31	49.12			-5	44	32.5		24	14	23	41.53			-13	54	53.4		

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
FEBRUARY 10									FEBRUARY 12								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	14	23	41.53	140.40	-13	54	53.4	-497.3	0	16	16	13.26	140.36	-18	38	21.3	-196.0
1	14	26	01.93	140.42	14	03	10.7	491.6	1	16	18	33.62	140.32	18	41	37.3	189.3
2	14	28	22.35	140.45	14	11	22.3	486.1	2	16	20	53.94	140.28	18	44	46.6	182.6
3	14	30	42.80	140.47	14	19	28.4	480.3	3	16	23	14.22	140.22	18	47	49.2	175.9
4	14	33	03.27	140.50	14	27	28.7	474.7	4	16	25	34.44	140.17	18	50	45.1	169.1
5	14	35	23.77	140.52	14	35	23.4	469.0	5	16	27	54.61	140.12	18	53	34.2	162.5
6	14	37	44.29	140.54	14	43	12.4	463.1	6	16	30	14.73	140.06	18	56	16.7	155.8
7	14	40	04.83	140.56	14	50	55.5	457.4	7	16	32	34.79	140.01	18	58	52.5	149.0
8	14	42	25.39	140.59	14	58	32.9	451.5	8	16	34	54.80	139.94	19	01	21.5	142.3
9	14	44	45.98	140.61	15	06	04.4	445.6	9	16	37	14.74	139.88	19	03	43.8	135.7
10	14	47	06.59	140.63	15	13	30.0	439.8	10	16	39	34.62	139.81	19	05	59.5	128.9
11	14	49	27.22	140.65	15	20	49.8	433.7	11	16	41	54.43	139.74	19	08	08.4	122.2
12	14	51	47.87	140.66	15	28	03.5	427.7	12	16	44	14.17	139.68	19	10	10.6	115.5
13	14	54	08.53	140.69	15	35	11.2	421.8	13	16	46	33.85	139.60	19	12	06.1	108.8
14	14	56	29.22	140.70	15	42	13.0	415.6	14	16	48	53.45	139.52	19	13	54.9	102.1
15	14	58	49.92	140.72	15	49	08.6	409.6	15	16	51	12.97	139.45	19	15	37.0	95.4
16	15	01	10.64	140.73	15	55	58.2	403.5	16	16	53	32.42	139.36	19	17	12.4	88.8
17	15	03	31.37	140.74	16	02	41.7	397.3	17	16	55	51.78	139.29	19	18	41.2	82.0
18	15	05	52.11	140.76	16	09	19.0	391.1	18	16	58	11.07	139.19	19	20	03.2	75.5
19	15	08	12.87	140.77	16	15	50.1	385.0	19	17	00	30.26	139.11	19	21	18.7	68.7
20	15	10	33.64	140.78	16	22	15.1	378.7	20	17	02	49.37	139.02	19	22	27.4	62.1
21	15	12	54.42	140.78	16	28	33.8	372.4	21	17	05	08.39	138.93	19	23	29.5	55.5
22	15	15	15.20	140.80	16	34	46.2	366.2	22	17	07	27.32	138.82	19	24	25.0	48.8
23	15	17	36.00	140.80	-16	40	52.4	-359.8	23	17	09	46.14	138.74	-19	25	13.8	-42.2
FEBRUARY 11									FEBRUARY 13								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	15	19	56.80	140.80	-16	46	52.2	-353.5	0	17	12	04.88	138.63	-19	25	56.0	-35.6
1	15	22	17.60	140.80	16	52	45.7	347.1	1	17	14	23.51	138.52	19	26	31.6	29.1
2	15	24	38.40	140.81	16	58	32.8	340.7	2	17	16	42.03	138.43	19	27	00.7	22.4
3	15	26	59.21	140.81	17	04	13.5	334.4	3	17	19	00.46	138.31	19	27	23.1	15.9
4	15	29	20.02	140.80	17	09	47.9	327.9	4	17	21	18.77	138.20	19	27	39.0	9.3
5	15	31	40.82	140.80	17	15	15.8	321.4	5	17	23	36.97	138.09	19	27	48.3	-2.8
6	15	34	01.62	140.80	17	20	37.2	315.0	6	17	25	55.06	137.98	19	27	51.1	+3.7
7	15	36	22.42	140.79	17	25	52.2	308.5	7	17	28	13.04	137.86	19	27	47.4	10.2
8	15	38	43.21	140.78	17	31	00.7	302.0	8	17	30	30.90	137.74	19	27	37.2	16.7
9	15	41	03.99	140.76	17	36	02.7	295.4	9	17	32	48.64	137.62	19	27	20.5	23.2
10	15	43	24.75	140.76	17	40	58.1	289.0	10	17	35	06.26	137.49	19	26	57.3	29.6
11	15	45	45.51	140.74	17	45	47.1	282.3	11	17	37	23.75	137.36	19	26	27.7	36.0
12	15	48	06.25	140.72	17	50	29.4	275.8	12	17	39	41.11	137.24	19	25	51.7	42.5
13	15	50	26.97	140.71	17	55	05.2	269.2	13	17	41	58.35	137.10	19	25	09.2	48.8
14	15	52	47.68	140.68	17	59	34.4	262.6	14	17	44	15.45	136.97	19	24	20.4	55.2
15	15	55	08.36	140.67	18	03	57.0	255.9	15	17	46	32.42	136.84	19	23	25.2	61.5
16	15	57	29.03	140.63	18	08	12.9	249.4	16	17	48	49.26	136.69	19	22	23.7	67.9
17	15	59	49.66	140.62	18	12	22.3	242.7	17	17	51	05.95	136.56	19	21	15.8	74.1
18	16	02	10.28	140.58	18	16	25.0	236.0	18	17	53	22.51	136.41	19	20	01.7	80.4
19	16	04	30.86	140.55	18	20	21.0	229.4	19	17	55	38.92	136.27	19	18	41.3	86.7
20	16	06	51.41	140.52	18	24	10.4	222.8	20	17	57	55.19	136.13	19	17	14.6	92.9
21	16	09	11.93	140.48	18	27	53.2	216.0	21	18	00	11.32	135.97	19	15	41.7	99.1
22	16	11	32.41	140.45	18	31	29.2	209.4	22	18	02	27.29	135.82	19	14	02.6	105.2
23	16	13	52.86	140.40	18	34	58.6	-202.7	23	18	04	43.11	135.67	19	12	17.4	+111.4
24	16	16	13.26		-18	38	21.3		24	18	06	58.78		-19	10	26.0	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
FEBRUARY 14									FEBRUARY 16									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	18	06	58.78	135.52	-19	10	26.0	+117.6	0	19	52	01.46	126.53	-15	51	23.2	+371.2	
1	18	09	14.30	135.36	19	08	28.4	123.6	1	19	54	07.99	126.34	15	45	12.0	375.4	
2	18	11	29.66	135.20	19	06	24.8	129.7	2	19	56	14.33	126.14	15	38	56.6	379.7	
3	18	13	44.86	135.04	19	04	15.1	135.7	3	19	58	20.47	125.93	15	32	36.9	384.0	
4	18	15	59.90	134.87	19	01	59.4	141.7	4	20	00	26.40	125.73	15	26	12.9	388.2	
5	18	18	14.77	134.72	18	59	37.7	147.7	5	20	02	32.13	125.53	15	19	44.7	392.3	
6	18	20	29.49	134.55	18	57	10.0	153.6	6	20	04	37.66	125.33	15	13	12.4	396.4	
7	18	22	44.04	134.38	18	54	36.4	159.6	7	20	06	42.99	125.13	15	06	36.0	400.4	
8	18	24	58.42	134.21	18	51	56.8	165.4	8	20	08	48.12	124.94	14	59	55.6	404.5	
9	18	27	12.63	134.04	18	49	11.4	171.3	9	20	10	53.06	124.73	14	53	11.1	408.5	
10	18	29	26.67	133.86	18	46	20.1	177.1	10	20	12	57.79	124.53	14	46	22.6	412.4	
11	18	31	40.53	133.70	18	43	23.0	182.9	11	20	15	02.32	124.33	14	39	30.2	416.2	
12	18	33	54.23	133.51	18	40	20.1	188.7	12	20	17	06.65	124.14	14	32	34.0	420.1	
13	18	36	07.74	133.34	18	37	11.4	194.4	13	20	19	10.79	123.94	14	25	33.9	423.9	
14	18	38	21.08	133.16	18	33	57.0	200.1	14	20	21	14.73	123.74	14	18	30.0	427.7	
15	18	40	34.24	132.99	18	30	36.9	205.7	15	20	23	18.47	123.55	14	11	22.3	431.4	
16	18	42	47.23	132.80	18	27	11.2	211.3	16	20	25	22.02	123.35	14	04	10.9	435.0	
17	18	45	00.03	132.61	18	23	39.9	217.0	17	20	27	25.37	123.15	13	56	55.9	438.7	
18	18	47	12.64	132.44	18	20	02.9	222.5	18	20	29	28.52	122.97	13	49	37.2	442.2	
19	18	49	25.08	132.25	18	16	20.4	228.0	19	20	31	31.49	122.77	13	42	15.0	445.8	
20	18	51	37.33	132.06	18	12	32.4	233.5	20	20	33	34.26	122.57	13	34	49.2	449.2	
21	18	53	49.39	131.87	18	08	38.9	238.9	21	20	35	36.83	122.39	13	27	20.0	452.7	
22	18	56	01.26	131.69	18	04	40.0	244.3	22	20	37	39.22	122.20	13	19	47.3	456.1	
23	18	58	12.95	131.50	-18	00	35.7	+249.7	23	20	39	41.42	122.00	-13	12	11.2	+459.5	
FEBRUARY 15									FEBRUARY 17									
0	19	00	24.45	131.30	-17	56	26.0	+255.1	0	20	41	43.42	121.82	-13	04	31.7	+462.7	
1	19	02	35.75	131.11	17	52	10.9	260.3	1	20	43	45.24	121.63	12	56	49.0	466.1	
2	19	04	46.86	130.93	17	47	50.6	265.6	2	20	45	46.87	121.44	12	49	02.9	469.2	
3	19	06	57.79	130.72	17	43	25.0	270.8	3	20	47	48.31	121.26	12	41	13.7	472.5	
4	19	09	08.51	130.54	17	38	54.2	276.0	4	20	49	49.57	121.08	12	33	21.2	475.5	
5	19	11	19.05	130.33	17	34	18.2	281.1	5	20	51	50.65	120.89	12	25	25.7	478.7	
6	19	13	29.38	130.15	17	29	37.1	286.3	6	20	53	51.54	120.71	12	17	27.0	481.7	
7	19	15	39.53	129.94	17	24	50.8	291.2	7	20	55	52.25	120.53	12	09	25.3	484.8	
8	19	17	49.47	129.75	17	19	59.6	296.4	8	20	57	52.78	120.35	12	01	20.5	487.6	
9	19	19	59.22	129.55	17	15	03.2	301.3	9	20	59	53.13	120.17	11	53	12.9	490.6	
10	19	22	08.77	129.35	17	10	01.9	306.2	10	21	01	53.30	119.99	11	45	02.3	493.5	
11	19	24	18.12	129.16	17	04	55.7	311.2	11	21	03	53.29	119.82	11	36	48.8	496.3	
12	19	26	27.28	128.95	16	59	44.5	316.0	12	21	05	53.11	119.64	11	28	32.5	499.1	
13	19	28	36.23	128.75	16	54	28.5	320.8	13	21	07	52.75	119.47	11	20	13.4	501.8	
14	19	30	44.98	128.56	16	49	07.7	325.6	14	21	09	52.22	119.30	11	11	51.6	504.6	
15	19	32	53.54	128.35	16	43	42.1	330.4	15	21	11	51.52	119.13	11	03	27.0	507.1	
16	19	35	01.89	128.15	16	38	11.7	335.0	16	21	13	50.65	118.96	10	54	59.9	509.8	
17	19	37	10.04	127.95	16	32	36.7	339.8	17	21	15	49.61	118.80	10	46	30.1	512.4	
18	19	39	17.99	127.75	16	26	56.9	344.3	18	21	17	48.41	118.62	10	37	57.7	514.9	
19	19	41	25.74	127.54	16	21	12.6	348.9	19	21	19	47.03	118.47	10	29	22.8	517.3	
20	19	43	33.28	127.35	16	15	23.7	353.4	20	21	21	45.50	118.30	10	20	45.5	519.8	
21	19	45	40.63	127.14	16	09	30.3	358.0	21	21	23	43.80	118.14	10	12	05.7	522.2	
22	19	47	47.77	126.95	16	03	32.3	362.3	22	21	25	41.94	117.98	10	03	23.5	524.6	
23	19	49	54.72	126.74	15	57	30.0	+366.8	23	21	27	39.92	117.82	9	54	38.9	+526.9	
24	19	52	01.46		-15	51	23.2		24	21	29	37.74		-	9	45	52.0	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
FEBRUARY 18									FEBRUARY 20								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	21	29	37.74	117.67	-9	45	52.0	+529.1	0	23	01	24.61	112.48	-2	12	43.4	+589.6
1	21	31	35.41	117.51	9	37	02.9	531.3	1	23	03	17.09	112.42	2	02	53.8	589.8
2	21	33	32.92	117.36	9	28	11.6	533.6	2	23	05	09.51	112.37	1	53	04.0	590.2
3	21	35	30.28	117.21	9	19	18.0	535.6	3	23	07	01.88	112.31	1	43	13.8	590.3
4	21	37	27.49	117.06	9	10	22.4	537.8	4	23	08	54.19	112.27	1	33	23.5	590.6
5	21	39	24.55	116.92	9	01	24.6	539.8	5	23	10	46.46	112.23	1	23	32.9	590.7
6	21	41	21.47	116.76	8	52	24.8	541.8	6	23	12	38.69	112.18	1	13	42.2	590.8
7	21	43	18.23	116.63	8	43	23.0	543.8	7	23	14	30.87	112.14	1	03	51.4	590.9
8	21	45	14.86	116.48	8	34	19.2	545.8	8	23	16	23.01	112.10	0	54	00.5	590.9
9	21	47	11.34	116.34	8	25	13.4	547.6	9	23	18	15.11	112.07	0	44	09.6	591.0
10	21	49	07.68	116.20	8	16	05.8	549.4	10	23	20	07.18	112.03	0	34	18.6	590.9
11	21	51	03.88	116.07	8	06	56.4	551.3	11	23	21	59.21	112.00	0	24	27.7	590.8
12	21	52	59.95	115.93	7	57	45.1	553.0	12	23	23	51.21	111.97	0	14	36.9	590.7
13	21	54	55.88	115.80	7	48	32.1	554.7	13	23	25	43.18	111.95	-0	04	46.2	590.6
14	21	56	51.68	115.67	7	39	17.4	556.4	14	23	27	35.13	111.92	+0	05	04.4	590.4
15	21	58	47.35	115.54	7	30	01.0	558.0	15	23	29	27.05	111.90	0	14	54.8	590.2
16	22	00	42.89	115.41	7	20	43.0	559.7	16	23	31	18.95	111.88	0	24	45.0	590.0
17	22	02	38.30	115.29	7	11	23.3	561.2	17	23	33	10.83	111.87	0	34	35.0	589.6
18	22	04	33.59	115.16	7	02	02.1	562.7	18	23	35	02.70	111.85	0	44	24.6	589.4
19	22	06	28.75	115.05	6	52	39.4	564.1	19	23	36	54.55	111.84	0	54	14.0	588.9
20	22	08	23.80	114.93	6	43	15.3	565.6	20	23	38	46.39	111.82	1	04	02.9	588.6
21	22	10	18.73	114.81	6	33	49.7	567.0	21	23	40	38.21	111.82	1	13	51.5	588.2
22	22	12	13.54	114.69	6	24	22.7	568.4	22	23	42	30.03	111.82	1	23	39.7	587.7
23	22	14	08.23	114.58	-6	14	54.3	+569.6	23	23	44	21.85	111.81	+1	33	27.4	+587.2
FEBRUARY 19									FEBRUARY 21								
0	22	16	02.81	114.47	-6	05	24.7	+570.9	0	23	46	13.66	111.82	+1	43	14.6	+586.7
1	22	17	57.28	114.37	5	55	53.8	572.2	1	23	48	05.48	111.81	1	53	01.3	586.1
2	22	19	51.65	114.26	5	46	21.6	573.3	2	23	49	57.29	111.82	2	02	47.4	585.5
3	22	21	45.91	114.15	5	36	48.3	574.5	3	23	51	49.11	111.83	2	12	32.9	584.8
4	22	23	40.06	114.05	5	27	13.8	575.6	4	23	53	40.94	111.84	2	22	17.7	584.2
5	22	25	34.11	113.95	5	17	38.2	576.6	5	23	55	32.78	111.85	2	32	01.9	583.5
6	22	27	28.06	113.85	5	08	01.6	577.7	6	23	57	24.63	111.86	2	41	45.4	582.7
7	22	29	21.91	113.76	4	58	23.9	578.7	7	23	59	16.49	111.88	2	51	28.1	582.0
8	22	31	15.67	113.67	4	48	45.2	579.7	8	0	01	08.37	111.90	3	01	10.1	581.1
9	22	33	09.34	113.57	4	39	05.5	580.5	9	0	03	00.27	111.93	3	10	51.2	580.3
10	22	35	02.91	113.49	4	29	25.0	581.4	10	0	04	52.20	111.94	3	20	31.5	579.4
11	22	36	56.40	113.39	4	19	43.6	582.3	11	0	06	44.14	111.97	3	30	10.9	578.5
12	22	38	49.79	113.32	4	10	01.3	583.0	12	0	08	36.11	112.01	3	39	49.4	577.5
13	22	40	43.11	113.23	4	00	18.3	583.8	13	0	10	28.12	112.03	3	49	26.9	576.6
14	22	42	36.34	113.15	3	50	34.5	584.5	14	0	12	20.15	112.07	3	59	03.5	575.5
15	22	44	29.49	113.07	3	40	50.0	585.2	15	0	14	12.22	112.10	4	08	39.0	574.4
16	22	46	22.56	113.00	3	31	04.8	585.9	16	0	16	04.32	112.14	4	18	13.4	573.4
17	22	48	15.56	112.92	3	21	18.9	586.4	17	0	17	56.46	112.19	4	27	46.8	572.3
18	22	50	08.48	112.85	3	11	32.5	587.0	18	0	19	48.65	112.22	4	37	19.1	571.1
19	22	52	01.33	112.79	3	01	45.5	587.5	19	0	21	40.87	112.28	4	46	50.2	569.9
20	22	53	54.12	112.72	2	51	58.0	588.0	20	0	23	33.15	112.32	4	56	20.1	568.6
21	22	55	46.84	112.65	2	42	10.0	588.5	21	0	25	25.47	112.37	5	05	48.7	567.4
22	22	57	39.49	112.59	2	32	21.5	588.8	22	0	27	17.84	112.42	5	15	16.1	566.1
23	22	59	32.08	112.53	2	22	32.7	+589.3	23	0	29	10.26	112.48	5	24	42.2	+564.8
24	23	01	24.61		-2	12	43.4		24	0	31	02.74		+5	34	07.0	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination						
FEBRUARY 22									FEBRUARY 24											
0	h	m	s	s	°	'	"	"	0	h	m	s	s	°	'	"	"			
0	0	31	02.74	112.54	+	5	34	07.0	+563.4	0	2	02	52.63	117.99	+12	28	38.9	+457.4		
1	0	32	55.28	112.60		5	43	30.4	562.0	1	2	04	50.62	118.17		12	36	16.3	454.4	
2	0	34	47.88	112.66		5	52	52.4	560.6	2	2	06	48.79	118.33		12	43	50.7	451.2	
3	0	36	40.54	112.73		6	02	13.0	559.1	3	2	08	47.12	118.50		12	51	21.9	448.2	
4	0	38	33.27	112.79		6	11	32.1	557.6	4	2	10	45.62	118.67		12	58	50.1	444.9	
5	0	40	26.06	112.87		6	20	49.7	556.1	5	2	12	44.29	118.84		13	06	15.0	441.8	
6	0	42	18.93	112.93		6	30	05.8	554.5	6	2	14	43.13	119.02		13	13	36.8	438.5	
7	0	44	11.86	113.01		6	39	20.3	552.9	7	2	16	42.15	119.19		13	20	55.3	435.2	
8	0	46	04.87	113.09		6	48	33.2	551.3	8	2	18	41.34	119.38		13	28	10.5	431.9	
9	0	47	57.96	113.17		6	57	44.5	549.5	9	2	20	40.72	119.55		13	35	22.4	428.5	
10	0	49	51.13	113.24		7	06	54.0	547.9	10	2	22	40.27	119.73		13	42	30.9	425.1	
11	0	51	44.37	113.34		7	16	01.9	546.2	11	2	24	40.00	119.91		13	49	36.0	421.8	
12	0	53	37.71	113.42		7	25	08.1	544.3	12	2	26	39.91	120.10		13	56	37.8	418.2	
13	0	55	31.13	113.50		7	34	12.4	542.6	13	2	28	40.01	120.28		14	03	36.0	414.8	
14	0	57	24.63	113.60		7	43	15.0	540.7	14	2	30	40.29	120.47		14	10	30.8	411.2	
15	0	59	18.23	113.69		7	52	15.7	538.8	15	2	32	40.76	120.66		14	17	22.0	407.6	
16	1	01	11.92	113.79		8	01	14.5	536.9	16	2	34	41.42	120.85		14	24	09.6	404.0	
17	1	03	05.71	113.89		8	10	11.4	535.0	17	2	36	42.27	121.04		14	30	53.6	400.4	
18	1	04	59.60	113.98		8	19	06.4	532.9	18	2	38	43.31	121.24		14	37	34.0	396.7	
19	1	06	53.58	114.09		8	27	59.3	531.0	19	2	40	44.55	121.43		14	44	10.7	392.9	
20	1	08	47.67	114.19		8	36	50.3	528.9	20	2	42	45.98	121.62		14	50	43.6	389.2	
21	1	10	41.86	114.30		8	45	39.2	526.9	21	2	44	47.60	121.83		14	57	12.8	385.4	
22	1	12	36.16	114.41		8	54	26.1	524.7	22	2	46	49.43	122.02		15	03	38.2	381.6	
23	1	14	30.57	114.52		+	9	03	10.8	+522.5	23	2	48	51.45	122.22		+15	09	59.8	+377.7
FEBRUARY 23									FEBRUARY 25											
0	1	16	25.09	114.63	+	9	11	53.3	+520.4	0	2	50	53.67	122.43	+15	16	17.5	+373.7		
1	1	18	19.72	114.75		9	20	33.7	518.2	1	2	52	56.10	122.62		15	22	31.2	369.9	
2	1	20	14.47	114.87		9	29	11.9	515.9	2	2	54	58.72	122.83		15	28	41.1	365.8	
3	1	22	09.34	114.99		9	37	47.8	513.6	3	2	57	01.55	123.04		15	34	46.9	361.8	
4	1	24	04.33	115.11		9	46	21.4	511.3	4	2	59	04.59	123.24		15	40	48.7	357.8	
5	1	25	59.44	115.24		9	54	52.7	508.9	5	3	01	07.83	123.45		15	46	46.5	353.7	
6	1	27	54.68	115.36		10	03	21.6	506.5	6	3	03	11.28	123.66		15	52	40.2	349.5	
7	1	29	50.04	115.49		10	11	48.1	504.2	7	3	05	14.94	123.86		15	58	29.7	345.3	
8	1	31	45.53	115.62		10	20	12.3	501.6	8	3	07	18.80	124.08		16	04	15.0	341.2	
9	1	33	41.15	115.76		10	28	33.9	499.1	9	3	09	22.88	124.29		16	09	56.2	336.8	
10	1	35	36.91	115.89		10	36	53.0	496.6	10	3	11	27.17	124.50		16	15	33.0	332.6	
11	1	37	32.80	116.03		10	45	09.6	494.1	11	3	13	31.67	124.71		16	21	05.6	328.3	
12	1	39	28.83	116.16		10	53	23.7	491.4	12	3	15	36.38	124.93		16	26	33.9	323.9	
13	1	41	24.99	116.31		11	01	35.1	488.8	13	3	17	41.31	125.14		16	31	57.8	319.5	
14	1	43	21.30	116.45		11	09	43.9	486.1	14	3	19	46.45	125.36		16	37	17.3	315.0	
15	1	45	17.75	116.60		11	17	50.0	483.4	15	3	21	51.81	125.57		16	42	32.3	310.6	
16	1	47	14.35	116.75		11	25	53.4	480.7	16	3	23	57.38	125.80		16	47	42.9	306.0	
17	1	49	11.10	116.89		11	33	54.1	477.9	17	3	26	03.18	126.01		16	52	48.9	301.5	
18	1	51	07.99	117.05		11	41	52.0	475.0	18	3	28	09.19	126.22		16	57	50.4	296.9	
19	1	53	05.04	117.20		11	49	47.0	472.3	19	3	30	15.41	126.45		17	02	47.3	292.3	
20	1	55	02.24	117.36		11	57	39.3	469.3	20	3	32	21.86	126.66		17	07	39.6	287.6	
21	1	56	59.60	117.52		12	05	28.6	466.4	21	3	34	28.52	126.89		17	12	27.2	282.9	
22	1	58	57.12	117.67		12	13	15.0	463.4	22	3	36	35.41	127.11		17	17	10.1	278.1	
23	2	00	54.79	117.84		12	20	58.4	+460.5	23	3	38	42.52	127.32		17	21	48.2	+273.4	
24	2	02	52.63		+12	28	38.9			24	3	40	49.84		+17	26	21.6			

UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
FEBRUARY 26						FEBRUARY 28					
	h	m	s	s	° ' "		h	m	s	s	° ' "
0	3	40	49.84	127.55	+17 26 21.6	0	5	26	57.77	137.69	+19 19 16.3
1	3	42	57.39	127.77	17 30 50.1	1	5	29	15.46	137.87	19 19 11.3
2	3	45	05.16	127.99	17 35 13.8	2	5	31	33.33	138.05	19 18 59.8
3	3	47	13.15	128.22	17 39 32.6	3	5	33	51.38	138.23	19 18 41.8
4	3	49	21.37	128.43	17 43 46.4	4	5	36	09.61	138.40	19 18 17.2
5	3	51	29.80	128.66	17 47 55.3	5	5	38	28.01	138.58	19 17 46.2
6	3	53	38.46	128.88	17 51 59.1	6	5	40	46.59	138.75	19 17 08.5
7	3	55	47.34	129.10	17 55 57.9	7	5	43	05.34	138.92	19 16 24.3
8	3	57	56.44	129.33	17 59 51.6	8	5	45	24.26	139.09	19 15 33.5
9	4	00	05.77	129.55	18 03 40.2	9	5	47	43.35	139.26	19 14 36.1
10	4	02	15.32	129.77	18 07 23.6	10	5	50	02.61	139.42	19 13 32.0
11	4	04	25.09	129.99	18 11 01.8	11	5	52	22.03	139.58	19 12 21.2
12	4	06	35.08	130.21	18 14 34.8	12	5	54	41.61	139.73	19 11 03.7
13	4	08	45.29	130.44	18 18 02.5	13	5	57	01.34	139.90	19 09 39.5
14	4	10	55.73	130.66	18 21 24.9	14	5	59	21.24	140.05	19 08 08.6
15	4	13	06.39	130.88	18 24 42.0	15	6	01	41.29	140.20	19 06 31.0
16	4	15	17.27	131.10	18 27 53.7	16	6	04	01.49	140.36	19 04 46.6
17	4	17	28.37	131.32	18 30 59.9	17	6	06	21.85	140.50	19 02 55.4
18	4	19	39.69	131.54	18 34 00.7	18	6	08	42.35	140.64	19 00 57.4
19	4	21	51.23	131.76	18 36 56.0	19	6	11	02.99	140.79	18 58 52.6
20	4	24	02.99	131.97	18 39 45.8	20	6	13	23.78	140.92	18 56 41.0
21	4	26	14.96	132.20	18 42 30.0	21	6	15	44.70	141.07	18 54 22.6
22	4	28	27.16	132.42	18 45 08.6	22	6	18	05.77	141.20	18 51 57.3
23	4	30	39.58	132.63	+18 47 41.6	23	6	20	26.97	141.33	+18 49 25.1
FEBRUARY 27						MARCH 1					
0	4	32	52.21	132.84	+18 50 08.9	0	6	22	48.30	141.47	+18 46 46.1
1	4	35	05.05	133.07	18 52 30.5	1	6	25	09.77	141.59	18 44 00.3
2	4	37	18.12	133.28	18 54 46.3	2	6	27	31.36	141.71	18 41 07.5
3	4	39	31.40	133.49	18 56 56.4	3	6	29	53.07	141.84	18 38 07.8
4	4	41	44.89	133.70	18 59 00.7	4	6	32	14.91	141.96	18 35 01.3
5	4	43	58.59	133.92	19 00 59.1	5	6	34	36.87	142.07	18 31 47.8
6	4	46	12.51	134.12	19 02 51.7	6	6	36	58.94	142.19	18 28 27.5
7	4	48	26.63	134.34	19 04 38.3	7	6	39	21.13	142.31	18 25 00.2
8	4	50	40.97	134.54	19 06 19.0	8	6	41	43.44	142.41	18 21 26.0
9	4	52	55.51	134.75	19 07 53.7	9	6	44	05.85	142.52	18 17 45.0
10	4	55	10.26	134.96	19 09 22.4	10	6	46	28.37	142.62	18 13 56.9
11	4	57	25.22	135.16	19 10 45.1	11	6	48	50.99	142.72	18 10 02.0
12	4	59	40.38	135.37	19 12 01.7	12	6	51	13.71	142.83	18 06 00.2
13	5	01	55.75	135.57	19 13 12.2	13	6	53	36.54	142.92	18 01 51.4
14	5	04	11.32	135.77	19 14 16.6	14	6	55	59.46	143.01	17 57 35.7
15	5	06	27.09	135.96	19 15 14.8	15	6	58	22.47	143.11	17 53 13.1
16	5	08	43.05	136.17	19 16 06.7	16	7	00	45.58	143.19	17 48 43.6
17	5	10	59.22	136.36	19 16 52.5	17	7	03	08.77	143.28	17 44 07.2
18	5	13	15.58	136.56	19 17 32.0	18	7	05	32.05	143.37	17 39 24.0
19	5	15	32.14	136.74	19 18 05.3	19	7	07	55.42	143.44	17 34 33.8
20	5	17	48.88	136.94	19 18 32.2	20	7	10	18.86	143.52	17 29 36.8
21	5	20	05.82	137.13	19 18 52.8	21	7	12	42.38	143.60	17 24 32.9
22	5	22	22.95	137.32	19 19 07.0	22	7	15	05.98	143.67	17 19 22.1
23	5	24	40.27	137.50	19 19 14.9	23	7	17	29.65	143.75	17 14 04.5
24	5	26	57.77		+19 19 16.3	24	7	19	53.40		+17 08 40.1

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
MARCH 2									MARCH 4								
	h	m	s		°	'	"			h	m	s		°	'	"	
0	7	19	53.40	s	+17	08	40.1		0	9	15	33.31	s	+10	44	15.4	
1	7	22	17.21	143.81	17	03	08.9	-331.2	1	9	17	58.02	144.71	10	33	56.0	-619.4
2	7	24	41.08	143.87	16	57	30.8	338.1	2	9	20	22.72	144.70	10	23	31.8	624.2
3	7	27	05.02	143.94	16	51	46.0	344.8	3	9	22	47.40	144.68	10	13	02.9	628.9
4	7	29	29.02	144.00	16	45	54.4	351.6	4	9	25	12.07	144.67	10	02	29.5	633.4
5	7	31	53.08	144.06	16	39	56.1	358.3	5	9	27	36.72	144.65	9	51	51.5	638.0
6	7	34	17.20	144.12	16	33	51.0	365.1	6	9	30	01.36	144.64	9	41	09.1	642.4
7	7	36	41.37	144.17	16	27	39.2	371.8	7	9	32	25.97	144.61	9	30	22.3	646.8
8	7	39	05.59	144.22	16	21	20.8	378.4	8	9	34	50.57	144.60	9	19	31.2	651.1
9	7	41	29.85	144.26	16	14	55.7	385.1	9	9	37	15.16	144.59	9	08	35.9	655.3
10	7	43	54.17	144.32	16	08	24.0	391.7	10	9	39	39.72	144.56	8	57	36.4	659.5
11	7	46	18.53	144.36	16	01	45.6	398.4	11	9	42	04.27	144.55	8	46	32.9	663.5
12	7	48	42.93	144.40	15	55	00.6	405.0	12	9	44	28.79	144.52	8	35	25.3	667.6
13	7	51	07.37	144.44	15	48	09.2	411.4	13	9	46	53.30	144.51	8	24	13.9	671.4
14	7	53	31.85	144.48	15	41	11.1	418.1	14	9	49	17.79	144.49	8	12	58.6	675.3
15	7	55	56.36	144.51	15	34	06.6	424.5	15	9	51	42.26	144.47	8	01	39.6	679.0
16	7	58	20.91	144.55	15	26	55.6	431.0	16	9	54	06.71	144.45	7	50	16.9	682.7
17	8	00	45.49	144.58	15	19	38.2	437.4	17	9	56	31.15	144.44	7	38	50.6	686.3
18	8	03	10.10	144.61	15	12	14.3	443.9	18	9	58	55.56	144.41	7	27	20.8	689.8
19	8	05	34.73	144.63	15	04	44.2	450.1	19	10	01	19.96	144.40	7	15	47.6	693.2
20	8	07	59.39	144.66	14	57	07.6	456.6	20	10	03	44.33	144.37	7	04	11.1	696.5
21	8	10	24.08	144.69	14	49	24.8	462.8	21	10	06	08.69	144.36	6	52	31.3	699.8
22	8	12	48.78	144.70	14	41	35.8	469.0	22	10	08	33.03	144.34	6	40	48.3	703.0
23	8	15	13.51	144.73	+14	33	40.5	475.3	23	10	10	57.35	144.32	+ 6	29	02.3	706.0
			144.74					-481.5				144.31					-709.1
MARCH 3									MARCH 5								
0	8	17	38.25	144.75	+14	25	39.0	-487.6	0	10	13	21.66	144.28	+ 6	17	13.2	-711.9
1	8	20	03.00	144.78	14	17	31.4	493.7	1	10	15	45.94	144.27	6	05	21.3	714.7
2	8	22	27.78	144.78	14	09	17.7	499.8	2	10	18	10.21	144.25	5	53	26.6	717.5
3	8	24	52.56	144.79	14	00	57.9	505.7	3	10	20	34.46	144.24	5	41	29.1	720.1
4	8	27	17.35	144.81	13	52	32.2	511.8	4	10	22	58.70	144.22	5	29	29.0	722.7
5	8	29	42.16	144.81	13	44	00.4	517.6	5	10	25	22.92	144.20	5	17	26.3	725.1
6	8	32	06.97	144.81	13	35	22.8	523.5	6	10	27	47.12	144.19	5	05	21.2	727.4
7	8	34	31.78	144.83	13	26	39.3	529.3	7	10	30	11.31	144.18	4	53	13.8	729.8
8	8	36	56.61	144.82	13	17	50.0	535.0	8	10	32	35.49	144.16	4	41	04.0	731.9
9	8	39	21.43	144.83	13	08	55.0	540.8	9	10	34	59.65	144.15	4	28	52.1	734.0
10	8	41	46.26	144.82	12	59	54.2	546.4	10	10	37	23.80	144.13	4	16	38.1	736.0
11	8	44	11.08	144.83	12	50	47.8	552.1	11	10	39	47.93	144.13	4	04	22.1	737.8
12	8	46	35.91	144.82	12	41	35.7	557.5	12	10	42	12.06	144.11	3	52	04.3	739.7
13	8	49	00.73	144.82	12	32	18.2	563.1	13	10	44	36.17	144.10	3	39	44.6	741.4
14	8	51	25.55	144.81	12	22	55.1	568.5	14	10	47	00.27	144.09	3	27	23.2	743.0
15	8	53	50.36	144.81	12	13	26.6	573.9	15	10	49	24.36	144.08	3	15	00.2	744.5
16	8	56	15.17	144.80	12	03	52.7	579.2	16	10	51	48.44	144.07	3	02	35.7	745.9
17	8	58	39.97	144.80	11	54	13.5	584.5	17	10	54	12.51	144.07	2	50	09.8	747.3
18	9	01	04.77	144.78	11	44	29.0	589.7	18	10	56	36.58	144.05	2	37	42.5	748.5
19	9	03	29.55	144.78	11	34	39.3	594.7	19	10	59	00.63	144.05	2	25	14.0	749.6
20	9	05	54.33	144.76	11	24	44.6	599.9	20	11	01	24.68	144.05	2	12	44.4	750.6
21	9	08	19.09	144.75	11	14	44.7	604.8	21	11	03	48.73	144.04	2	00	13.8	751.6
22	9	10	43.84	144.74	11	04	39.9	609.8	22	11	06	12.77	144.04	1	47	42.2	752.4
23	9	13	08.58	144.73	10	54	30.1	-614.7	23	11	08	36.81	144.03	1	35	09.8	-753.2
24	9	15	33.31		+10	44	15.4		24	11	11	00.84		+ 1	22	36.6	

UNIVERSAL TIME

Hour	Right Ascension		Declination		Hour	Right Ascension		Declination	
MARCH 6					MARCH 8				
	h	m	s	"		h	m	s	"
0	11	11	00.84	+1 22 36.6	0	13	06	27.67	- 8 22 41.2
1	11	13	24.87	1 10 02.8	1	13	08	52.55	8 33 53.0
2	11	15	48.90	0 57 28.5	2	13	11	17.45	8 45 00.9
3	11	18	12.93	0 44 53.7	3	13	13	42.38	8 56 04.7
4	11	20	36.96	0 32 18.5	4	13	16	07.34	9 07 04.5
5	11	23	01.00	0 19 43.1	5	13	18	32.34	9 18 00.2
6	11	25	25.03	+0 07 07.6	6	13	20	57.36	9 28 51.6
7	11	27	49.07	-0 05 28.0	7	13	23	22.41	9 39 38.8
8	11	30	13.11	0 18 03.6	8	13	25	47.49	9 50 21.6
9	11	32	37.16	0 30 39.0	9	13	28	12.60	10 00 59.9
10	11	35	01.21	0 43 14.2	10	13	30	37.74	10 11 33.7
11	11	37	25.27	0 55 49.0	11	13	33	02.90	10 22 02.9
12	11	39	49.34	1 08 23.4	12	13	35	28.10	10 32 27.5
13	11	42	13.41	1 20 57.2	13	13	37	53.32	10 42 47.3
14	11	44	37.50	1 33 30.5	14	13	40	18.57	10 53 02.3
15	11	47	01.59	1 46 02.9	15	13	42	43.85	11 03 12.5
16	11	49	25.70	1 58 34.6	16	13	45	09.15	11 13 17.7
17	11	51	49.82	2 11 05.3	17	13	47	34.48	11 23 17.9
18	11	54	13.95	2 23 35.0	18	13	49	59.83	11 33 13.0
19	11	56	38.10	2 36 03.6	19	13	52	25.21	11 43 03.0
20	11	59	02.26	2 48 31.0	20	13	54	50.61	11 52 47.8
21	12	01	26.44	3 00 57.0	21	13	57	16.03	12 02 27.4
22	12	03	50.63	3 13 21.6	22	13	59	41.48	12 12 01.6
23	12	06	14.84	-3 25 44.8	23	14	02	06.94	-12 21 30.4
				-741.5					-563.4
MARCH 7					MARCH 9				
0	12	08	39.07	-3 38 06.3	0	14	04	32.43	-12 30 53.8
1	12	11	03.32	3 50 26.1	1	14	06	57.93	12 40 11.7
2	12	13	27.58	4 02 44.1	2	14	09	23.46	12 49 24.0
3	12	15	51.87	4 15 00.3	3	14	11	49.00	12 58 30.7
4	12	18	16.18	4 27 14.4	4	14	14	14.55	13 07 31.7
5	12	20	40.51	4 39 26.5	5	14	16	40.12	13 16 27.0
6	12	23	04.86	4 51 36.5	6	14	19	05.70	13 25 16.5
7	12	25	29.24	5 03 44.1	7	14	21	31.30	13 34 00.2
8	12	27	53.64	5 15 49.4	8	14	23	56.90	13 42 38.0
9	12	30	18.06	5 27 52.3	9	14	26	22.51	13 51 09.9
10	12	32	42.51	5 39 52.6	10	14	28	48.13	13 59 35.7
11	12	35	06.99	5 51 50.3	11	14	31	13.76	14 07 55.6
12	12	37	31.49	6 03 45.3	12	14	33	39.39	14 16 09.4
13	12	39	56.01	6 15 37.5	13	14	36	05.03	14 24 17.0
14	12	42	20.57	6 27 26.7	14	14	38	30.66	14 32 18.5
15	12	44	45.15	6 39 13.0	15	14	40	56.30	14 40 13.8
16	12	47	09.76	6 50 56.3	16	14	43	21.93	14 48 02.8
17	12	49	34.40	7 02 36.3	17	14	45	47.56	14 55 45.5
18	12	51	59.06	7 14 13.2	18	14	48	13.19	15 03 21.9
19	12	54	23.76	7 25 46.6	19	14	50	38.81	15 10 51.9
20	12	56	48.48	7 37 16.7	20	14	53	04.42	15 18 15.6
21	12	59	13.24	7 48 43.3	21	14	55	30.01	15 25 32.7
22	13	01	38.02	8 00 06.3	22	14	57	55.60	15 32 43.4
23	13	04	02.83	8 11 25.7	23	15	00	21.17	15 39 47.6
24	13	06	27.67	-8 22 41.2	24	15	02	46.72	-15 46 45.2

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
MARCH 10									MARCH 12								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	15	02	46.72	145.53	-15	46	45.2	-411.0	0	16	58	06.17	141.69	-19	06	10.2	-78.5
1	15	05	12.25	145.52	15	53	36.2	404.5	1	17	00	27.86	141.55	19	07	28.7	71.5
2	15	07	37.77	145.49	16	00	20.7	397.8	2	17	02	49.41	141.40	19	08	40.2	64.8
3	15	10	03.26	145.46	16	06	58.5	391.1	3	17	05	10.81	141.25	19	09	45.0	57.8
4	15	12	28.72	145.44	16	13	29.6	384.4	4	17	07	32.06	141.11	19	10	42.8	51.1
5	15	14	54.16	145.40	16	19	54.0	377.7	5	17	09	53.17	140.94	19	11	33.9	44.3
6	15	17	19.56	145.37	16	26	11.7	370.9	6	17	12	14.11	140.79	19	12	18.2	37.5
7	15	19	44.93	145.34	16	32	22.6	364.2	7	17	14	34.90	140.64	19	12	55.7	30.7
8	15	22	10.27	145.30	16	38	26.8	357.3	8	17	16	55.54	140.47	19	13	26.4	24.1
9	15	24	35.57	145.27	16	44	24.1	350.6	9	17	19	16.01	140.30	19	13	50.5	17.3
10	15	27	00.84	145.22	16	50	14.7	343.7	10	17	21	36.31	140.14	19	14	07.8	10.6
11	15	29	26.06	145.17	16	55	58.4	336.8	11	17	23	56.45	139.98	19	14	18.4	-3.9
12	15	31	51.23	145.13	17	01	35.2	330.0	12	17	26	16.43	139.80	19	14	22.3	+2.7
13	15	34	16.36	145.08	17	07	05.2	323.0	13	17	28	36.23	139.63	19	14	19.6	9.3
14	15	36	41.44	145.03	17	12	28.2	316.2	14	17	30	55.86	139.45	19	14	10.3	15.9
15	15	39	06.47	144.98	17	17	44.4	309.2	15	17	33	15.31	139.28	19	13	54.4	22.4
16	15	41	31.45	144.91	17	22	53.6	302.2	16	17	35	34.59	139.10	19	13	32.0	29.0
17	15	43	56.36	144.86	17	27	55.8	295.4	17	17	37	53.69	138.92	19	13	03.0	35.6
18	15	46	21.22	144.80	17	32	51.2	288.3	18	17	40	12.61	138.73	19	12	27.4	42.0
19	15	48	46.02	144.73	17	37	39.5	281.4	19	17	42	31.34	138.55	19	11	45.4	48.4
20	15	51	10.75	144.67	17	42	20.9	274.3	20	17	44	49.89	138.37	19	10	57.0	54.9
21	15	53	35.42	144.59	17	46	55.2	267.4	21	17	47	08.26	138.17	19	10	02.1	61.3
22	15	56	00.01	144.52	17	51	22.6	260.3	22	17	49	26.43	137.99	19	09	00.8	67.6
23	15	58	24.53	144.45	-17	55	42.9	-253.4	23	17	51	44.42	137.79	-19	07	53.2	+74.0
MARCH 11									MARCH 13								
0	16	00	48.98	144.37	-17	59	56.3	-246.3	0	17	54	02.21	137.60	-19	06	39.2	+80.3
1	16	03	13.35	144.29	18	04	02.6	239.3	1	17	56	19.81	137.40	19	05	18.9	86.6
2	16	05	37.64	144.21	18	08	01.9	232.2	2	17	58	37.21	137.21	19	03	52.3	92.8
3	16	08	01.85	144.12	18	11	54.1	225.2	3	18	00	54.42	137.00	19	02	19.5	99.0
4	16	10	25.97	144.03	18	15	39.3	218.2	4	18	03	11.42	136.81	19	00	40.5	105.2
5	16	12	50.00	143.94	18	19	17.5	211.2	5	18	05	28.23	136.60	18	58	55.3	111.4
6	16	15	13.94	143.84	18	22	48.7	204.1	6	18	07	44.83	136.41	18	57	03.9	117.5
7	16	17	37.78	143.75	18	26	12.8	197.0	7	18	10	01.24	136.19	18	55	06.4	123.5
8	16	20	01.53	143.65	18	29	29.8	190.1	8	18	12	17.43	135.99	18	53	02.9	129.6
9	16	22	25.18	143.55	18	32	39.9	183.0	9	18	14	33.42	135.79	18	50	53.3	135.6
10	16	24	48.73	143.45	18	35	42.9	176.0	10	18	16	49.21	135.57	18	48	37.7	141.6
11	16	27	12.18	143.33	18	38	38.9	168.9	11	18	19	04.78	135.36	18	46	16.1	147.5
12	16	29	35.51	143.23	18	41	27.8	161.9	12	18	21	20.14	135.16	18	43	48.6	153.4
13	16	31	58.74	143.11	18	44	09.7	155.0	13	18	23	35.30	134.94	18	41	15.2	159.3
14	16	34	21.85	142.99	18	46	44.7	147.9	14	18	25	50.24	134.72	18	38	35.9	165.1
15	16	36	44.84	142.88	18	49	12.6	140.9	15	18	28	04.96	134.51	18	35	50.8	171.0
16	16	39	07.72	142.76	18	51	33.5	133.9	16	18	30	19.47	134.30	18	32	59.8	176.6
17	16	41	30.48	142.63	18	53	47.4	127.0	17	18	32	33.77	134.08	18	30	03.2	182.4
18	16	43	53.11	142.51	18	55	54.4	119.9	18	18	34	47.85	133.86	18	27	00.8	188.1
19	16	46	15.62	142.38	18	57	54.3	113.1	19	18	37	01.71	133.65	18	23	52.7	193.7
20	16	48	38.00	142.24	18	59	47.4	106.1	20	18	39	15.36	133.42	18	20	39.0	199.4
21	16	51	00.24	142.11	19	01	33.5	99.1	21	18	41	28.78	133.21	18	17	19.6	204.9
22	16	53	22.35	141.98	19	03	12.6	92.3	22	18	43	41.99	132.98	18	13	54.7	210.4
23	16	55	44.33	141.84	19	04	44.9	-85.3	23	18	45	54.97	132.77	18	10	24.3	+215.9
24	16	58	06.17		-19	06	10.2		24	18	48	07.74		-18	06	48.4	

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
MARCH 14						MARCH 16					
	h	m	s	s	° ' " "		h	m	s	s	° ' " "
0	18 48	07.74		132.54	-18 06 48.4 +221.4	0	20 29	59.16		122.08	-13 39 44.4 +434.7
1	18 50	20.28		132.32	18 03 07.0 226.8	1	20 32	01.24		121.87	13 32 29.7 438.1
2	18 52	32.60		132.10	17 59 20.2 232.2	2	20 34	03.11		121.69	13 25 11.6 441.5
3	18 54	44.70		131.87	17 55 28.0 237.5	3	20 36	04.80		121.48	13 17 50.1 444.9
4	18 56	56.57		131.65	17 51 30.5 242.8	4	20 38	06.28		121.30	13 10 25.2 448.2
5	18 59	08.22		131.43	17 47 27.7 248.0	5	20 40	07.58		121.10	13 02 57.0 451.4
6	19 01	19.65		131.20	17 43 19.7 253.3	6	20 42	08.68		120.91	12 55 25.6 454.6
7	19 03	30.85		130.98	17 39 06.4 258.4	7	20 44	09.59		120.72	12 47 51.0 457.8
8	19 05	41.83		130.75	17 34 48.0 263.6	8	20 46	10.31		120.54	12 40 13.2 460.9
9	19 07	52.58		130.53	17 30 24.4 268.6	9	20 48	10.85		120.35	12 32 32.3 464.0
10	19 10	03.11		130.30	17 25 55.8 273.7	10	20 50	11.20		120.16	12 24 48.3 467.0
11	19 12	13.41		130.08	17 21 22.1 278.7	11	20 52	11.36		119.98	12 17 01.3 470.1
12	19 14	23.49		129.85	17 16 43.4 283.7	12	20 54	11.34		119.80	12 09 11.2 473.0
13	19 16	33.34		129.63	17 11 59.7 288.6	13	20 56	11.14		119.63	12 01 18.2 476.0
14	19 18	42.97		129.40	17 07 11.1 293.5	14	20 58	10.77		119.44	11 53 22.2 478.8
15	19 20	52.37		129.17	17 02 17.6 298.4	15	21 00	10.21		119.27	11 45 23.4 481.7
16	19 23	01.54		128.95	16 57 19.2 303.1	16	21 02	09.48		119.09	11 37 21.7 484.4
17	19 25	10.49		128.73	16 52 16.1 307.9	17	21 04	08.57		118.92	11 29 17.3 487.3
18	19 27	19.22		128.50	16 47 08.2 312.6	18	21 06	07.49		118.75	11 21 10.0 489.9
19	19 29	27.72		128.28	16 41 55.6 317.3	19	21 08	06.24		118.58	11 13 00.1 492.7
20	19 31	36.00		128.06	16 36 38.3 322.0	20	21 10	04.82		118.41	11 04 47.4 495.2
21	19 33	44.06		127.83	16 31 16.3 326.5	21	21 12	03.23		118.25	10 56 32.2 497.9
22	19 35	51.89		127.60	16 25 49.8 331.1	22	21 14	01.48		118.08	10 48 14.3 500.5
23	19 37	59.49		127.39	-16 20 18.7 +335.6	23	21 15	59.56		117.92	-10 39 53.8 +502.9
MARCH 15						MARCH 17					
	h	m	s	s	° ' " "		h	m	s	s	° ' " "
0	19 40	06.88		127.16	-16 14 43.1 +340.1	0	21 17	57.48		117.77	-10 31 30.9 +505.5
1	19 42	14.04		126.94	16 09 03.0 344.5	1	21 19	55.25		117.60	10 23 05.4 507.9
2	19 44	20.98		126.72	16 03 18.5 348.9	2	21 21	52.85		117.45	10 14 37.5 510.3
3	19 46	27.70		126.50	15 57 29.6 353.2	3	21 23	50.30		117.29	10 06 07.2 512.6
4	19 48	34.20		126.28	15 51 36.4 357.5	4	21 25	47.59		117.15	9 57 34.6 515.0
5	19 50	40.48		126.06	15 45 38.9 361.8	5	21 27	44.74		116.99	9 48 59.6 517.3
6	19 52	46.54		125.84	15 39 37.1 366.0	6	21 29	41.73		116.84	9 40 22.3 519.5
7	19 54	52.38		125.62	15 33 31.1 370.2	7	21 31	38.57		116.70	9 31 42.8 521.7
8	19 56	58.00		125.41	15 27 20.9 374.4	8	21 33	35.27		116.55	9 23 01.1 523.8
9	19 59	03.41		125.19	15 21 06.5 378.4	9	21 35	31.82		116.41	9 14 17.3 526.0
10	20 01	08.60		124.98	15 14 48.1 382.4	10	21 37	28.23		116.28	9 05 31.3 528.1
11	20 03	13.58		124.76	15 08 25.7 386.5	11	21 39	24.51		116.13	8 56 43.2 530.1
12	20 05	18.34		124.55	15 01 59.2 390.4	12	21 41	20.64		116.00	8 47 53.1 532.1
13	20 07	22.89		124.33	14 55 28.8 394.4	13	21 43	16.64		115.86	8 39 01.0 534.1
14	20 09	27.22		124.13	14 48 54.4 398.2	14	21 45	12.50		115.73	8 30 06.9 536.0
15	20 11	31.35		123.91	14 42 16.2 402.1	15	21 47	08.23		115.60	8 21 10.9 538.0
16	20 13	35.26		123.71	14 35 34.1 405.8	16	21 49	03.83		115.47	8 12 12.9 539.7
17	20 15	38.97		123.50	14 28 48.3 409.7	17	21 50	59.30		115.35	8 03 13.2 541.6
18	20 17	42.47		123.29	14 21 58.6 413.3	18	21 52	54.65		115.22	7 54 11.6 543.3
19	20 19	45.76		123.09	14 15 05.3 417.0	19	21 54	49.87		115.11	7 45 08.3 545.1
20	20 21	48.85		122.88	14 08 08.3 420.6	20	21 56	44.98		114.98	7 36 03.2 546.8
21	20 23	51.73		122.68	14 01 07.7 424.2	21	21 58	39.96		114.87	7 26 56.4 548.4
22	20 25	54.41		122.47	13 54 03.5 427.8	22	22 00	34.83		114.75	7 17 48.0 550.1
23	20 27	56.88		122.28	13 46 55.7 +431.3	23	22 02	29.58		114.64	7 08 37.9 +551.6
24	20 29	59.16			-13 39 44.4	24	22 04	24.22			- 6 59 26.3

UNIVERSAL TIME

Hour	Right Ascension	Declination	Hour	Right Ascension	Declination
MARCH 18			MARCH 20		
0	h m s 22 04 24.22 ^s	° ' " " -6 59 26.3 ["]	0	h m s 23 34 37.77 ^s	° ' " " +0 40 37.1 ["]
1	22 06 18.74 ^{114.52}	6 50 13.1 ^{+553.2}	1	23 36 29.62 ^{111.85}	0 50 20.5 ^{+583.4}
2	22 08 13.16 ^{114.42}	6 40 58.4 ^{554.7}	2	23 38 21.47 ^{111.85}	1 00 03.7 ^{583.2}
3	22 10 07.48 ^{114.32}	6 31 42.2 ^{556.2}	3	23 40 13.32 ^{111.85}	1 09 46.5 ^{582.8}
4	22 12 01.68 ^{114.20}	6 22 24.6 ^{557.6}	4	23 42 05.17 ^{111.85}	1 19 29.1 ^{582.6}
5	22 13 55.79 ^{114.11}	6 13 05.7 ^{558.9}	5	23 43 57.04 ^{111.87}	1 29 11.2 ^{582.1}
6	22 15 49.80 ^{114.01}	6 03 45.3 ^{560.4}	6	23 45 48.91 ^{111.87}	1 38 52.9 ^{581.7}
7	22 17 43.71 ^{113.91}	5 54 23.7 ^{561.6}	7	23 47 40.79 ^{111.88}	1 48 34.2 ^{581.3}
8	22 19 37.52 ^{113.81}	5 45 00.8 ^{562.9}	8	23 49 32.68 ^{111.89}	1 58 15.0 ^{580.8}
9	22 21 31.24 ^{113.72}	5 35 36.6 ^{564.2}	9	23 51 24.59 ^{111.91}	2 07 55.3 ^{580.3}
10	22 23 24.87 ^{113.63}	5 26 11.2 ^{565.4}	10	23 53 16.52 ^{111.93}	2 17 35.1 ^{579.8}
11	22 25 18.41 ^{113.54}	5 16 44.7 ^{566.5}	11	23 55 08.46 ^{111.94}	2 27 14.2 ^{579.1}
12	22 27 11.87 ^{113.46}	5 07 17.0 ^{567.7}	12	23 57 00.43 ^{111.97}	2 36 52.7 ^{578.5}
13	22 29 05.24 ^{113.37}	4 57 48.3 ^{568.7}	13	23 58 52.42 ^{111.99}	2 46 30.5 ^{577.8}
14	22 30 58.53 ^{113.29}	4 48 18.5 ^{569.8}	14	0 00 44.44 ^{112.02}	2 56 07.7 ^{577.2}
15	22 32 51.74 ^{113.21}	4 38 47.6 ^{570.9}	15	0 02 36.49 ^{112.05}	3 05 44.1 ^{576.4}
16	22 34 44.87 ^{113.13}	4 29 15.9 ^{571.7}	16	0 04 28.57 ^{112.08}	3 15 19.7 ^{575.6}
17	22 36 37.93 ^{113.06}	4 19 43.1 ^{572.8}	17	0 06 20.68 ^{112.11}	3 24 54.6 ^{574.9}
18	22 38 30.91 ^{112.98}	4 10 09.5 ^{573.6}	18	0 08 12.82 ^{112.14}	3 34 28.6 ^{574.0}
19	22 40 23.82 ^{112.91}	4 00 35.0 ^{574.5}	19	0 10 05.01 ^{112.19}	3 44 01.7 ^{573.1}
20	22 42 16.67 ^{112.85}	3 50 59.6 ^{575.4}	20	0 11 57.23 ^{112.22}	3 53 33.9 ^{572.2}
21	22 44 09.45 ^{112.78}	3 41 23.5 ^{576.1}	21	0 13 49.49 ^{112.26}	4 03 05.1 ^{571.2}
22	22 46 02.16 ^{112.71}	3 31 46.6 ^{576.9}	22	0 15 41.80 ^{112.31}	4 12 35.4 ^{570.3}
23	22 47 54.81 ^{112.65}	-3 22 09.0 ^{577.6}	23	0 17 34.15 ^{112.35}	+4 22 04.6 ^{569.2}
		+578.3			+568.1
MARCH 19			MARCH 21		
0	22 49 47.41 ^{112.53}	-3 12 30.7 ^{+578.9}	0	0 19 26.55 ^{112.45}	+4 31 32.7 ^{+567.1}
1	22 51 39.94 ^{112.48}	3 02 51.8 ^{579.5}	1	0 21 19.00 ^{112.50}	4 40 59.8 ^{566.0}
2	22 53 32.42 ^{112.43}	2 53 12.3 ^{580.1}	2	0 23 11.50 ^{112.56}	4 50 25.8 ^{564.7}
3	22 55 24.85 ^{112.38}	2 43 32.2 ^{580.7}	3	0 25 04.06 ^{112.61}	4 59 50.5 ^{563.6}
4	22 57 17.23 ^{112.33}	2 33 51.5 ^{581.1}	4	0 26 56.67 ^{112.67}	5 09 14.1 ^{562.3}
5	22 59 09.56 ^{112.29}	2 24 10.4 ^{581.6}	5	0 28 49.34 ^{112.74}	5 18 36.4 ^{561.1}
6	23 01 01.85 ^{112.24}	2 14 28.8 ^{582.0}	6	0 30 42.08 ^{112.79}	5 27 57.5 ^{559.7}
7	23 02 54.09 ^{112.20}	2 04 46.8 ^{582.4}	7	0 32 34.87 ^{112.86}	5 37 17.2 ^{558.4}
8	23 04 46.29 ^{112.16}	1 55 04.4 ^{582.8}	8	0 34 27.73 ^{112.93}	5 46 35.6 ^{557.0}
9	23 06 38.45 ^{112.13}	1 45 21.6 ^{583.0}	9	0 36 20.66 ^{112.99}	5 55 52.6 ^{555.6}
10	23 08 30.58 ^{112.09}	1 35 38.6 ^{583.4}	10	0 38 13.65 ^{113.07}	6 05 08.2 ^{554.2}
11	23 10 22.67 ^{112.06}	1 25 55.2 ^{583.6}	11	0 40 06.72 ^{113.13}	6 14 22.4 ^{552.6}
12	23 12 14.73 ^{112.03}	1 16 11.6 ^{583.8}	12	0 41 59.85 ^{113.22}	6 23 35.0 ^{551.1}
13	23 14 06.76 ^{112.00}	1 06 27.8 ^{584.0}	13	0 43 53.07 ^{113.29}	6 32 46.1 ^{549.6}
14	23 15 58.76 ^{111.98}	0 56 43.8 ^{584.0}	14	0 45 46.36 ^{113.37}	6 41 55.7 ^{548.0}
15	23 17 50.74 ^{111.95}	0 46 59.8 ^{584.2}	15	0 47 39.73 ^{113.44}	6 51 03.7 ^{546.3}
16	23 19 42.69 ^{111.94}	0 37 15.6 ^{584.3}	16	0 49 33.17 ^{113.54}	7 00 10.0 ^{544.6}
17	23 21 34.63 ^{111.91}	0 27 31.3 ^{584.3}	17	0 51 26.71 ^{113.61}	7 09 14.6 ^{543.0}
18	23 23 26.54 ^{111.90}	0 17 47.0 ^{584.2}	18	0 53 20.32 ^{113.70}	7 18 17.6 ^{541.2}
19	23 25 18.44 ^{111.88}	-0 08 02.8 ^{584.2}	19	0 55 14.02 ^{113.80}	7 27 18.8 ^{539.4}
20	23 27 10.32 ^{111.88}	+0 01 41.4 ^{584.2}	20	0 57 07.82 ^{113.88}	7 36 18.2 ^{537.6}
21	23 29 02.20 ^{111.86}	0 11 25.6 ^{584.0}	21	0 59 01.70 ^{113.97}	7 45 15.8 ^{535.7}
22	23 30 54.06 ^{111.86}	0 21 09.6 ^{583.8}	22	1 00 55.67 ^{114.07}	7 54 11.5 ^{533.9}
23	23 32 45.92 ^{111.85}	0 30 53.4 ^{+583.7}	23	1 02 49.74 ^{114.16}	8 03 05.4 ^{+531.9}
24	23 34 37.77	+0 40 37.1	24	1 04 43.90	+8 11 57.3

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
MARCH 22									MARCH 24										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	1	04	43.90	114.27	+	8	11	57.3	+530.0	0	2	38	29.71	120.84	+14	27	53.3	+393.0	
1	1	06	38.17	114.36		8	20	47.3	527.9	1	2	40	30.55	121.00		14	34	26.3	389.4
2	1	08	32.53	114.46		8	29	35.2	525.9	2	2	42	31.55	121.17		14	40	55.7	385.6
3	1	10	26.99	114.57		8	38	21.1	523.9	3	2	44	32.72	121.34		14	47	21.3	381.7
4	1	12	21.56	114.67		8	47	05.0	521.8	4	2	46	34.06	121.50		14	53	43.0	377.9
5	1	14	16.23	114.78		8	55	46.8	519.6	5	2	48	35.56	121.68		15	00	00.9	374.0
6	1	16	11.01	114.89		9	04	26.4	517.4	6	2	50	37.24	121.85		15	06	14.9	370.2
7	1	18	05.90	115.00		9	13	03.8	515.2	7	2	52	39.09	122.02		15	12	25.1	366.1
8	1	20	00.90	115.11		9	21	39.0	513.0	8	2	54	41.11	122.20		15	18	31.2	362.2
9	1	21	56.01	115.22		9	30	12.0	510.6	9	2	56	43.31	122.37		15	24	33.4	358.1
10	1	23	51.23	115.34		9	38	42.6	508.4	10	2	58	45.68	122.54		15	30	31.5	354.1
11	1	25	46.57	115.46		9	47	11.0	506.0	11	3	00	48.22	122.72		15	36	25.6	350.0
12	1	27	42.03	115.58		9	55	37.0	503.6	12	3	02	50.94	122.89		15	42	15.6	345.8
13	1	29	37.61	115.70		10	04	00.6	501.1	13	3	04	53.83	123.07		15	48	01.4	341.7
14	1	31	33.31	115.82		10	12	21.7	498.7	14	3	06	56.90	123.24		15	53	43.1	337.5
15	1	33	29.13	115.95		10	20	40.4	496.2	15	3	09	00.14	123.42		15	59	20.6	333.3
16	1	35	25.08	116.07		10	28	56.6	493.6	16	3	11	03.56	123.60		16	04	53.9	329.0
17	1	37	21.15	116.20		10	37	10.2	491.1	17	3	13	07.16	123.77		16	10	22.9	324.7
18	1	39	17.35	116.32		10	45	21.3	488.4	18	3	15	10.93	123.95		16	15	47.6	320.3
19	1	41	13.67	116.46		10	53	29.7	485.8	19	3	17	14.88	124.14		16	21	07.9	316.0
20	1	43	10.13	116.59		11	01	35.5	483.1	20	3	19	19.02	124.30		16	26	23.9	311.5
21	1	45	06.72	116.73		11	09	38.6	480.4	21	3	21	23.32	124.49		16	31	35.4	307.1
22	1	47	03.45	116.86		11	17	39.0	477.6	22	3	23	27.81	124.67		16	36	42.5	302.7
23	1	49	00.31	116.99	+	11	25	36.6	+474.8	23	3	25	32.48	124.84	+	16	41	45.2	+298.1
MARCH 23									MARCH 25										
0	1	50	57.30	117.14	+	11	33	31.4	+472.0	0	3	27	37.32	125.03	+	16	46	43.3	+293.6
1	1	52	54.44	117.27		11	41	23.4	469.1	1	3	29	42.35	125.20		16	51	36.9	288.9
2	1	54	51.71	117.42		11	49	12.5	466.2	2	3	31	47.55	125.38		16	56	25.8	284.4
3	1	56	49.13	117.55		11	56	58.7	463.2	3	3	33	52.93	125.56		17	01	10.2	279.7
4	1	58	46.68	117.70		12	04	41.9	460.3	4	3	35	58.49	125.75		17	05	49.9	275.1
5	2	00	44.38	117.85		12	12	22.2	457.3	5	3	38	04.24	125.92		17	10	25.0	270.3
6	2	02	42.23	117.99		12	19	59.5	454.2	6	3	40	10.16	126.10		17	14	55.3	265.6
7	2	04	40.22	118.15		12	27	33.7	451.1	7	3	42	16.26	126.28		17	19	20.9	260.8
8	2	06	38.37	118.29		12	35	04.8	448.0	8	3	44	22.54	126.45		17	23	41.7	256.0
9	2	08	36.66	118.44		12	42	32.8	444.9	9	3	46	28.99	126.64		17	27	57.7	251.2
10	2	10	35.10	118.59		12	49	57.7	441.6	10	3	48	35.63	126.82		17	32	08.9	246.2
11	2	12	33.69	118.74		12	57	19.3	438.4	11	3	50	42.45	126.99		17	36	15.1	241.4
12	2	14	32.43	118.90		13	04	37.7	435.2	12	3	52	49.44	127.18		17	40	16.5	236.4
13	2	16	31.33	119.06		13	11	52.9	431.8	13	3	54	56.62	127.35		17	44	12.9	231.4
14	2	18	30.39	119.21		13	19	04.7	428.5	14	3	57	03.97	127.53		17	48	04.3	226.4
15	2	20	29.60	119.37		13	26	13.2	425.1	15	3	59	11.50	127.71		17	51	50.7	221.4
16	2	22	28.97	119.52		13	33	18.3	421.7	16	4	01	19.21	127.88		17	55	32.1	216.3
17	2	24	28.49	119.69		13	40	20.0	418.3	17	4	03	27.09	128.06		17	59	08.4	211.3
18	2	26	28.18	119.85		13	47	18.3	414.7	18	4	05	35.15	128.24		18	02	39.7	206.0
19	2	28	28.03	120.01		13	54	13.0	411.3	19	4	07	43.39	128.41		18	06	05.7	201.0
20	2	30	28.04	120.17		14	01	04.3	407.6	20	4	09	51.80	128.59		18	09	26.7	195.7
21	2	32	28.21	120.34		14	07	51.9	404.1	21	4	12	00.39	128.76		18	12	42.4	190.5
22	2	34	28.55	120.50		14	14	36.0	400.5	22	4	14	09.15	128.94		18	15	52.9	185.2
23	2	36	29.05	120.66		14	21	16.5	+396.8	23	4	16	18.09	129.11		18	18	58.1	+180.0
24	2	38	29.71		+	14	27	53.3		24	4	18	27.20		+	18	21	58.1	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
MARCH 26									MARCH 28										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	4	18	27.20		+18	21	58.1	+174.6	0	6	04	48.81		+18	53	49.5	-109.0		
1	4	20	36.48	129.28		18	24	52.7	169.3	1	6	07	05.06	136.25		18	52	00.5	115.3
2	4	22	45.94	129.46		18	27	42.0	163.9	2	6	09	21.41	136.35		18	50	05.2	121.7
3	4	24	55.57	129.63		18	30	25.9	163.9	3	6	11	37.88	136.47		18	48	03.5	128.0
4	4	27	05.36	129.79		18	33	04.4	158.5	4	6	13	54.45	136.57		18	45	55.5	128.0
5	4	29	15.33	129.97		18	35	37.5	153.1	5	6	16	11.12	136.67		18	43	41.1	134.4
6	4	31	25.47	130.14		18	38	05.1	147.6	6	6	18	27.90	136.78		18	41	20.4	140.7
7	4	33	35.77	130.30		18	40	27.3	142.2	7	6	20	44.77	136.87		18	38	53.3	147.1
8	4	35	46.24	130.47		18	42	43.9	136.6	8	6	23	01.74	136.97		18	36	19.8	153.5
9	4	37	56.88	130.64		18	44	55.0	131.1	9	6	25	18.81	137.07		18	33	39.9	159.9
10	4	40	07.68	130.80		18	47	00.5	125.5	10	6	27	35.98	137.17		18	30	53.7	166.2
11	4	42	18.65	130.97		18	49	00.4	119.9	11	6	29	53.23	137.25		18	28	01.0	172.7
12	4	44	29.78	131.13		18	50	54.7	114.3	12	6	32	10.58	137.35		18	25	02.0	179.0
13	4	46	41.08	131.30		18	52	43.3	108.6	13	6	34	28.02	137.44		18	21	56.5	185.5
14	4	48	52.53	131.45		18	54	26.3	103.0	14	6	36	45.55	137.53		18	18	44.7	191.8
15	4	51	04.15	131.62		18	56	03.5	97.2	15	6	39	03.16	137.61		18	15	26.4	198.3
16	4	53	15.93	131.78		18	57	35.0	91.5	16	6	41	20.86	137.70		18	12	01.7	204.7
17	4	55	27.86	131.93		18	59	00.8	85.8	17	6	43	38.64	137.78		18	08	30.7	211.0
18	4	57	39.95	132.09		19	00	20.8	80.0	18	6	45	56.50	137.86		18	04	53.2	217.5
19	4	59	52.19	132.24		19	01	35.0	74.2	19	6	48	14.44	137.94		18	01	09.4	223.8
20	5	02	04.59	132.40		19	02	43.4	68.4	20	6	50	32.46	138.02		17	57	19.1	230.3
21	5	04	17.15	132.56		19	03	45.9	62.5	21	6	52	50.55	138.09		17	53	22.4	236.7
22	5	06	29.85	132.70		19	04	42.6	56.7	22	6	55	08.72	138.17		17	49	19.4	243.0
23	5	08	42.71	132.86		+19	05	33.4	50.8	23	6	57	26.97	138.25		+17	45	10.0	249.4
				133.00					+44.8				138.31					-255.9	
MARCH 27									MARCH 29										
0	5	10	55.71		+19	06	18.2		0	6	59	45.28		+17	40	54.1			
1	5	13	08.87	133.16		19	06	57.1	+38.9	1	7	02	03.66	138.38		17	36	31.9	-262.2
2	5	15	22.17	133.30		19	07	30.1	33.0	2	7	04	22.12	138.46		17	32	03.4	268.5
3	5	17	35.61	133.44		19	07	57.0	26.9	3	7	06	40.64	138.52		17	27	28.4	275.0
4	5	19	49.20	133.59		19	08	18.0	21.0	4	7	08	59.22	138.58		17	22	47.1	281.3
5	5	22	02.93	133.73		19	08	32.9	14.9	5	7	11	17.87	138.65		17	17	59.5	287.6
6	5	24	16.80	133.87		19	08	41.8	8.9	6	7	13	36.58	138.71		17	13	05.5	294.0
7	5	26	30.81	134.01		19	08	44.7	+2.9	7	7	15	55.36	138.78		17	08	05.1	300.4
8	5	28	44.96	134.15		19	08	41.5	-3.2	8	7	18	14.19	138.83		17	02	58.5	306.6
9	5	30	59.25	134.29		19	08	32.1	9.4	9	7	20	33.08	138.89		17	02	58.5	312.9
10	5	33	13.67	134.42		19	08	16.7	15.4	10	7	22	52.03	138.95		16	57	45.6	319.3
11	5	35	28.22	134.55		19	07	55.1	21.6	11	7	25	11.03	139.00		16	52	26.3	325.5
12	5	37	42.90	134.68		19	07	27.4	27.7	12	7	27	30.09	139.06		16	47	00.8	331.8
13	5	39	57.72	134.82		19	06	53.5	33.9	13	7	29	49.20	139.11		16	41	29.0	338.1
14	5	42	12.66	134.94		19	06	13.4	40.1	14	7	32	08.36	139.16		16	35	50.9	344.3
15	5	44	27.73	135.07		19	05	27.1	46.3	15	7	34	27.57	139.21		16	30	06.6	350.5
16	5	46	42.93	135.20		19	04	34.6	52.5	16	7	36	46.83	139.26		16	24	16.1	356.7
17	5	48	58.25	135.32		19	03	35.9	58.7	17	7	39	06.13	139.30		16	18	19.4	362.9
18	5	51	13.69	135.44		19	02	31.0	64.9	18	7	41	25.49	139.36		16	12	16.5	369.1
19	5	53	29.25	135.56		19	01	19.8	71.2	19	7	43	44.89	139.40		16	06	07.4	375.3
20	5	55	44.93	135.68		19	00	02.3	77.5	20	7	46	04.33	139.44		15	59	52.1	381.3
21	5	58	00.73	135.80		18	58	38.6	83.7	21	7	48	23.82	139.49		15	53	30.8	387.5
22	6	00	16.64	135.91		18	57	08.5	90.1	22	7	50	43.35	139.53		15	47	03.3	393.6
23	6	02	32.67	136.03		18	55	32.2	96.3	23	7	53	02.92	139.57		15	40	29.7	399.6
24	6	04	48.81	136.14		+18	53	49.5	-102.7	24	7	55	22.53	139.61		15	33	50.1	-405.7
																+15	27	04.4	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
MARCH 30									APRIL 1								
	h	m	s	"	°	'	"	"		h	m	s	"	°	'	"	"
0	7	55	22.53		+15	27	04.4	-411.7	0	9	47	40.11		+8	15	15.5	-655.3
1	7	57	42.18	139.65	15	20	12.7	417.7	1	9	50	01.19	141.08	8	04	20.2	659.0
2	8	00	01.86	139.68	15	13	15.0	423.7	2	9	52	22.31	141.12	7	53	21.2	662.8
3	8	02	21.59	139.73	15	06	11.3	429.6	3	9	54	43.47	141.16	7	42	18.4	666.3
4	8	04	41.35	139.76	14	59	01.7	435.6	4	9	57	04.66	141.19	7	31	12.1	670.0
5	8	07	01.15	139.80	14	51	46.1	441.4	5	9	59	25.89	141.23	7	20	02.1	673.4
6	8	09	20.98	139.83	14	44	24.7	447.3	6	10	01	47.15	141.26	7	08	48.7	676.9
7	8	11	40.84	139.86	14	36	57.4	453.1	7	10	04	08.46	141.31	6	57	31.8	680.2
8	8	14	00.74	139.90	14	29	24.3	458.9	8	10	06	29.81	141.35	6	46	11.6	683.5
9	8	16	20.67	139.93	14	21	45.4	464.6	9	10	08	51.19	141.38	6	34	48.1	686.7
10	8	18	40.64	139.97	14	14	00.8	470.4	10	10	11	12.62	141.43	6	23	21.4	689.8
11	8	21	00.63	139.99	14	06	10.4	476.1	11	10	13	34.09	141.47	6	11	51.6	692.8
12	8	23	20.66	140.03	13	58	14.3	481.8	12	10	15	55.61	141.52	6	00	18.8	695.9
13	8	25	40.71	140.05	13	50	12.5	487.4	13	10	18	17.17	141.56	5	48	42.9	698.7
14	8	28	00.80	140.09	13	42	05.1	492.9	14	10	20	38.77	141.60	5	37	04.2	701.6
15	8	30	20.91	140.11	13	33	52.2	498.6	15	10	23	00.43	141.66	5	25	22.6	704.3
16	8	32	41.06	140.15	13	25	33.6	504.0	16	10	25	22.13	141.70	5	13	38.3	707.0
17	8	35	01.23	140.17	13	17	09.6	509.6	17	10	27	43.88	141.75	5	01	51.3	709.5
18	8	37	21.43	140.20	13	08	40.0	514.9	18	10	30	05.68	141.80	4	50	01.8	712.1
19	8	39	41.65	140.22	13	00	05.1	520.4	19	10	32	27.53	141.85	4	38	09.7	714.5
20	8	42	01.91	140.26	12	51	24.7	525.7	20	10	34	49.43	141.90	4	26	15.2	716.8
21	8	44	22.19	140.28	12	42	39.0	531.0	21	10	37	11.38	141.95	4	14	18.4	719.1
22	8	46	42.50	140.31	12	33	48.0	536.3	22	10	39	33.39	142.01	4	02	19.3	721.2
23	8	49	02.83	140.33	+12	24	51.7	-541.5	23	10	41	55.46	142.07	+3	50	18.1	-723.3
				140.37									142.12				
MARCH 31									APRIL 2								
	h	m	s	"	°	'	"	"		h	m	s	"	°	'	"	"
0	8	51	23.20		+12	15	50.2	-546.8	0	10	44	17.58		+3	38	14.8	-725.4
1	8	53	43.58	140.38	12	06	43.4	551.8	1	10	46	39.76	142.18	3	26	09.4	727.3
2	8	56	04.00	140.42	11	57	31.6	556.9	2	10	49	02.00	142.24	3	14	02.1	729.1
3	8	58	24.44	140.44	11	48	14.7	562.0	3	10	51	24.30	142.30	3	01	53.0	730.8
4	9	00	44.91	140.47	11	38	52.7	567.0	4	10	53	46.66	142.36	2	49	42.2	732.5
5	9	03	05.40	140.49	11	29	25.7	571.9	5	10	56	09.08	142.42	2	37	29.7	734.1
6	9	05	25.92	140.52	11	19	53.8	576.8	6	10	58	31.57	142.49	2	25	15.6	735.5
7	9	07	46.47	140.55	11	10	17.0	581.7	7	11	00	54.12	142.55	2	13	00.1	737.0
8	9	10	07.04	140.57	11	00	35.3	586.4	8	11	03	16.74	142.62	2	00	43.1	738.2
9	9	12	27.64	140.60	10	50	48.9	591.2	9	11	05	39.42	142.68	1	48	24.9	739.5
10	9	14	48.27	140.63	10	40	57.7	595.9	10	11	08	02.17	142.75	1	36	05.4	740.6
11	9	17	08.93	140.66	10	31	01.8	600.5	11	11	10	25.00	142.83	1	23	44.8	741.6
12	9	19	29.61	140.68	10	21	01.3	605.0	12	11	12	47.89	142.89	1	11	23.2	742.5
13	9	21	50.32	140.71	10	10	56.3	609.6	13	11	15	10.85	142.96	0	59	00.7	743.4
14	9	24	11.06	140.74	10	00	46.7	614.1	14	11	17	33.89	143.04	0	46	37.3	744.2
15	9	26	31.83	140.77	9	50	32.6	618.4	15	11	19	57.01	143.12	0	34	13.1	744.8
16	9	28	52.62	140.79	9	40	14.2	622.8	16	11	22	20.20	143.19	0	21	48.3	745.4
17	9	31	13.45	140.83	9	29	51.4	627.1	17	11	24	43.46	143.26	+0	09	22.9	745.8
18	9	33	34.31	140.86	9	19	24.3	631.2	18	11	27	06.80	143.34	-0	03	02.9	746.2
19	9	35	55.19	140.88	9	08	53.1	635.5	19	11	29	30.22	143.42	0	15	29.1	746.5
20	9	38	16.11	140.92	8	58	17.6	639.5	20	11	31	53.73	143.51	0	27	55.6	746.7
21	9	40	37.06	140.95	8	47	38.1	643.6	21	11	34	17.31	143.58	0	40	22.3	746.8
22	9	42	58.05	140.99	8	36	54.5	647.5	22	11	36	40.97	143.66	0	52	49.1	746.7
23	9	45	19.06	141.01	8	26	07.0	-651.5	23	11	39	04.72	143.75	1	05	15.8	-746.7
24	9	47	40.11	141.05	+8	15	15.5		24	11	41	28.56	143.84	-1	17	42.5	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination						
APRIL 3									APRIL 5											
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"			
0	11	41	28.56	143.91	-	1	17	42.5	-746.5	0	13	38	24.43	148.54	-10	41	11.6	-623.1		
1	11	43	52.47	144.01		1	30	09.0	746.2	1	13	40	52.97	148.63		10	51	34.7	618.3	
2	11	46	16.48	144.09		1	42	35.2	745.8	2	13	43	21.60	148.71		11	01	53.0	613.4	
3	11	48	40.57	144.18		1	55	01.0	745.3	3	13	45	50.31	148.80		11	12	06.4	608.4	
4	11	51	04.75	144.27		2	07	26.3	744.7	4	13	48	19.11	148.88		11	22	14.8	603.3	
5	11	53	29.02	144.35		2	19	51.0	744.0	5	13	50	47.99	148.96		11	32	18.1	598.2	
6	11	55	53.37	144.45		2	32	15.0	743.2	6	13	53	16.95	149.05		11	42	16.3	593.0	
7	11	58	17.82	144.54		2	44	38.2	742.4	7	13	55	46.00	149.12		11	52	09.3	587.8	
8	12	00	42.36	144.64		2	57	00.6	741.3	8	13	58	15.12	149.19		12	01	57.1	582.3	
9	12	03	07.00	144.73		3	09	21.9	740.3	9	14	00	44.31	149.27		12	11	39.4	576.9	
10	12	05	31.73	144.82		3	21	42.2	739.2	10	14	03	13.58	149.35		12	21	16.3	571.4	
11	12	07	56.55	144.91		3	34	01.4	737.8	11	14	05	42.93	149.41		12	30	47.7	565.9	
12	12	10	21.46	145.02		3	46	19.2	736.5	12	14	08	12.34	149.48		12	40	13.6	560.1	
13	12	12	46.48	145.11		3	58	35.7	734.9	13	14	10	41.82	149.55		12	49	33.7	554.5	
14	12	15	11.59	145.20		4	10	50.6	733.5	14	14	13	11.37	149.62		12	58	48.2	548.6	
15	12	17	36.79	145.30		4	23	04.1	731.7	15	14	15	40.99	149.67		13	07	56.8	542.8	
16	12	20	02.09	145.41		4	35	15.8	730.0	16	14	18	10.66	149.74		13	16	59.6	536.8	
17	12	22	27.50	145.50		4	47	25.8	728.1	17	14	20	40.40	149.79		13	25	56.4	530.9	
18	12	24	53.00	145.60		4	59	33.9	726.1	18	14	23	10.19	149.85		13	34	47.3	524.8	
19	12	27	18.60	145.69		5	11	40.0	724.1	19	14	25	40.04	149.90		13	43	32.1	518.7	
20	12	29	44.29	145.80		5	23	44.1	721.9	20	14	28	09.94	149.95		13	52	10.8	512.5	
21	12	32	10.09	145.90		5	35	46.0	719.7	21	14	30	39.89	149.99		14	00	43.3	506.3	
22	12	34	35.99	146.00		5	47	45.7	717.3	22	14	33	09.88	150.04		14	09	09.6	500.0	
23	12	37	01.99	146.10		-	5	59	43.0	-714.8	23	14	35	39.92	150.09		-14	17	29.6	-493.6
APRIL 4									APRIL 6											
0	12	39	28.09	146.20	-	6	11	37.8	-712.3	0	14	38	10.01	150.12	-14	25	43.2	-487.2		
1	12	41	54.29	146.30		6	23	30.1	709.7	1	14	40	40.13	150.16		14	33	50.4	480.7	
2	12	44	20.59	146.41		6	35	19.8	706.9	2	14	43	10.29	150.19		14	41	51.1	474.2	
3	12	46	47.00	146.50		6	47	06.7	704.0	3	14	45	40.48	150.22		14	49	45.3	467.7	
4	12	49	13.50	146.61		6	58	50.7	701.1	4	14	48	10.70	150.24		14	57	33.0	461.0	
5	12	51	40.11	146.71		7	10	31.8	698.1	5	14	50	40.94	150.27		15	05	14.0	454.4	
6	12	54	06.82	146.80		7	22	09.9	695.0	6	14	53	11.21	150.29		15	12	48.4	447.6	
7	12	56	33.62	146.91		7	33	44.9	691.7	7	14	55	41.50	150.31		15	20	16.0	440.9	
8	12	59	00.53	147.01		7	45	16.6	688.5	8	14	58	11.81	150.32		15	27	36.9	434.1	
9	13	01	27.54	147.11		7	56	45.1	685.0	9	15	00	42.13	150.34		15	34	51.0	427.2	
10	13	03	54.65	147.21		8	08	10.1	681.5	10	15	03	12.47	150.34		15	41	58.2	420.3	
11	13	06	21.86	147.31		8	19	31.6	677.9	11	15	05	42.81	150.34		15	48	58.5	413.4	
12	13	08	49.17	147.41		8	30	49.5	674.3	12	15	08	13.15	150.34		15	55	51.9	406.4	
13	13	11	16.58	147.51		8	42	03.8	670.4	13	15	10	43.49	150.34		16	02	38.3	399.3	
14	13	13	44.09	147.60		8	53	14.2	666.6	14	15	13	13.83	150.34		16	09	17.6	392.3	
15	13	16	11.69	147.71		9	04	20.8	662.7	15	15	15	44.17	150.32		16	15	49.9	385.3	
16	13	18	39.40	147.80		9	15	23.5	658.6	16	15	18	14.49	150.31		16	22	15.2	378.1	
17	13	21	07.20	147.89		9	26	22.1	654.4	17	15	20	44.80	150.29		16	28	33.3	370.9	
18	13	23	35.09	147.99		9	37	16.5	650.3	18	15	23	15.09	150.27		16	34	44.2	363.8	
19	13	26	03.08	148.09		9	48	06.8	645.9	19	15	25	45.36	150.25		16	40	48.0	356.5	
20	13	28	31.17	148.18		9	58	52.7	641.5	20	15	28	15.61	150.21		16	46	44.5	349.4	
21	13	30	59.35	148.27		10	09	34.2	637.1	21	15	30	45.82	150.19		16	52	33.9	342.0	
22	13	33	27.62	148.36		10	20	11.3	632.5	22	15	33	16.01	150.14		16	58	15.9	334.8	
23	13	35	55.98	148.45		10	30	43.8	-627.8	23	15	35	46.15	150.11		17	03	50.7	-327.4	
24	13	38	24.43			-10	41	11.6		24	15	38	16.26			-17	09	18.1		

UNIVERSAL TIME

Hour	Right Ascension	Declination	Hour	Right Ascension	Declination
APRIL 7			APRIL 9		
	h m s s	° ' " "		h m s s	° ' " "
0	15 38 16.26 150.06	-17 09 18.1 -320.1	0	17 36 16.06 143.36	-19 05 46.8 + 32.3
1	15 40 46.32 150.01	17 14 38.2 312.7	1	17 38 39.42 143.12	19 05 14.5 39.1
2	15 43 16.33 149.96	17 19 50.9 305.3	2	17 41 02.54 142.91	19 04 35.4 46.0
3	15 45 46.29 149.91	17 24 56.2 298.0	3	17 43 25.45 142.67	19 03 49.4 52.8
4	15 48 16.20 149.84	17 29 54.2 290.5	4	17 45 48.12 142.44	19 02 56.6 59.5
5	15 50 46.04 149.78	17 34 44.7 283.1	5	17 48 10.56 142.20	19 01 57.1 66.3
6	15 53 15.82 149.71	17 39 27.8 275.7	6	17 50 32.76 141.97	19 00 50.8 72.9
7	15 55 45.53 149.64	17 44 03.5 268.2	7	17 52 54.73 141.73	18 59 37.9 79.6
8	15 58 15.17 149.56	17 48 31.7 260.7	8	17 55 16.46 141.49	18 58 18.3 86.2
9	16 00 44.73 149.48	17 52 52.4 253.3	9	17 57 37.95 141.25	18 56 52.1 92.8
10	16 03 14.21 149.40	17 57 05.7 245.7	10	17 59 59.20 141.00	18 55 19.3 99.3
11	16 05 43.61 149.31	18 01 11.4 238.3	11	18 02 20.20 140.75	18 53 40.0 105.7
12	16 08 12.92 149.21	18 05 09.7 230.8	12	18 04 40.95 140.50	18 51 54.3 112.3
13	16 10 42.13 149.12	18 09 00.5 223.3	13	18 07 01.45 140.25	18 50 02.0 118.6
14	16 13 11.25 149.02	18 12 43.8 215.8	14	18 09 21.70 140.00	18 48 03.4 125.0
15	16 15 40.27 148.91	18 16 19.6 208.2	15	18 11 41.70 139.74	18 45 58.4 131.3
16	16 18 09.18 148.81	18 19 47.8 200.8	16	18 14 01.44 139.48	18 43 47.1 137.6
17	16 20 37.99 148.69	18 23 08.6 193.3	17	18 16 20.92 139.23	18 41 29.5 143.9
18	16 23 06.68 148.57	18 26 21.9 185.8	18	18 18 40.15 138.97	18 39 05.6 150.0
19	16 25 35.25 148.46	18 29 27.7 178.2	19	18 20 59.12 138.70	18 36 35.6 156.2
20	16 28 03.71 148.33	18 32 25.9 170.8	20	18 23 17.82 138.45	18 33 59.4 162.3
21	16 30 32.04 148.20	18 35 16.7 163.3	21	18 25 36.27 138.18	18 31 17.1 168.3
22	16 33 00.24 148.07	18 38 00.0 155.8	22	18 27 54.45 137.91	18 28 28.8 174.4
23	16 35 28.31 147.93	-18 40 35.8 -148.4	23	18 30 12.36 137.65	-18 25 34.4 +180.3
APRIL 8			APRIL 10		
	h m s s	° ' " "		h m s s	° ' " "
0	16 37 56.24 147.79	-18 43 04.2 -140.9	0	18 32 30.01 137.38	-18 22 34.1 +186.2
1	16 40 24.03 147.65	18 45 25.1 133.4	1	18 34 47.39 137.11	18 19 27.9 192.2
2	16 42 51.68 147.50	18 47 38.5 126.0	2	18 37 04.50 136.84	18 16 15.7 198.0
3	16 45 19.18 147.34	18 49 44.5 118.6	3	18 39 21.34 136.57	18 12 57.7 203.7
4	16 47 46.52 147.19	18 51 43.1 111.2	4	18 41 37.91 136.30	18 09 34.0 209.5
5	16 50 13.71 147.04	18 53 34.3 103.7	5	18 43 54.21 136.03	18 06 04.5 215.2
6	16 52 40.75 146.87	18 55 18.0 96.5	6	18 46 10.24 135.76	18 02 29.3 220.8
7	16 55 07.62 146.70	18 56 54.5 89.0	7	18 48 26.00 135.48	17 58 48.5 226.5
8	16 57 34.32 146.53	18 58 23.5 81.7	8	18 50 41.48 135.21	17 55 02.0 232.0
9	17 00 00.85 146.36	18 59 45.2 74.4	9	18 52 56.69 134.94	17 51 10.0 237.4
10	17 02 27.21 146.18	19 00 59.6 67.2	10	18 55 11.63 134.66	17 47 12.6 243.0
11	17 04 53.39 146.00	19 02 06.8 59.8	11	18 57 26.29 134.38	17 43 09.6 248.3
12	17 07 19.39 145.81	19 03 06.6 52.6	12	18 59 40.67 134.11	17 39 01.3 253.7
13	17 09 45.20 145.63	19 03 59.2 45.4	13	19 01 54.78 133.83	17 34 47.6 259.1
14	17 12 10.83 145.44	19 04 44.6 38.1	14	19 04 08.61 133.56	17 30 28.5 264.2
15	17 14 36.27 145.24	19 05 22.7 31.0	15	19 06 22.17 133.28	17 26 04.3 269.5
16	17 17 01.51 145.04	19 05 53.7 23.8	16	19 08 35.45 133.01	17 21 34.8 274.7
17	17 19 26.55 144.84	19 06 17.5 16.8	17	19 10 48.46 132.73	17 17 00.1 279.8
18	17 21 51.39 144.64	19 06 34.3 9.6	18	19 13 01.19 132.45	17 12 20.3 284.9
19	17 24 16.03 144.43	19 06 43.9 - 2.6	19	19 15 13.64 132.18	17 07 35.4 289.8
20	17 26 40.46 144.23	19 06 46.5 + 4.5	20	19 17 25.82 131.91	17 02 45.6 294.9
21	17 29 04.69 144.01	19 06 42.0 11.4	21	19 19 37.73 131.63	16 57 50.7 299.8
22	17 31 28.70 143.79	19 06 30.6 18.5	22	19 21 49.36 131.35	16 52 50.9 304.6
23	17 33 52.49 143.57	19 06 12.1 + 25.3	23	19 24 00.71 131.08	16 47 46.3 +309.5
24	17 36 16.06	-19 05 46.8	24	19 26 11.79	-16 42 36.8

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
APRIL 11									APRIL 13								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	19	26	11.79		-16	42	36.8	+314.3	0	21	06	02.54		-11	15	41.1	+489.5
1	19	28	22.60	130.81	16	37	22.5	319.0	1	21	08	01.73	119.19	11	07	31.6	491.9
2	19	30	33.14	130.54	16	32	03.5	323.7	2	21	10	00.73	119.00	10	59	19.7	494.6
3	19	32	43.40	130.26	16	26	39.8	328.3	3	21	11	59.53	118.80	10	51	05.1	497.0
4	19	34	53.39	129.99	16	21	11.5	333.0	4	21	13	58.14	118.61	10	42	48.1	499.5
5	19	37	03.11	129.72	16	15	38.5	337.4	5	21	15	56.57	118.43	10	34	28.6	501.9
6	19	39	12.56	129.45	16	10	01.1	342.0	6	21	17	54.80	118.23	10	26	06.7	504.3
7	19	41	21.74	129.18	16	04	19.1	346.4	7	21	19	52.86	118.06	10	17	42.4	506.6
8	19	43	30.65	128.91	15	58	32.7	350.8	8	21	21	50.73	117.87	10	09	15.8	509.0
9	19	45	39.29	128.64	15	52	41.9	355.2	9	21	23	48.42	117.69	10	00	46.8	511.2
10	19	47	47.67	128.38	15	46	46.7	359.4	10	21	25	45.94	117.52	9	52	15.6	513.4
11	19	49	55.78	128.11	15	40	47.3	363.7	11	21	27	43.29	117.35	9	43	42.2	515.6
12	19	52	03.63	127.85	15	34	43.6	368.0	12	21	29	40.46	117.17	9	35	06.6	517.7
13	19	54	11.21	127.58	15	28	35.6	372.1	13	21	31	37.46	117.00	9	26	28.9	519.9
14	19	56	18.53	127.32	15	22	23.5	376.2	14	21	33	34.30	116.84	9	17	49.0	521.9
15	19	58	25.59	127.06	15	16	07.3	380.3	15	21	35	30.98	116.68	9	09	07.1	524.0
16	20	00	32.39	126.80	15	09	47.0	384.3	16	21	37	27.49	116.51	9	00	23.1	526.0
17	20	02	38.94	126.55	15	03	22.7	388.2	17	21	39	23.85	116.36	8	51	37.1	527.9
18	20	04	45.22	126.28	14	56	54.5	392.2	18	21	41	20.04	116.19	8	42	49.2	529.8
19	20	06	51.25	126.03	14	50	22.3	396.1	19	21	43	16.09	116.05	8	33	59.4	531.7
20	20	08	57.03	125.78	14	43	46.2	400.0	20	21	45	11.99	115.90	8	25	07.7	533.6
21	20	11	02.55	125.52	14	37	06.2	403.7	21	21	47	07.73	115.74	8	16	14.1	535.3
22	20	13	07.82	125.27	14	30	22.5	407.5	22	21	49	03.33	115.60	8	07	18.8	537.2
23	20	15	12.84	125.02	-14	23	35.0	+411.1	23	21	50	58.79	115.46	-7	58	21.6	+538.8
			124.78										115.32				
APRIL 12									APRIL 14								
0	20	17	17.62	124.52	-14	16	43.9	+414.8	0	21	52	54.11	115.18	-7	49	22.8	+540.6
1	20	19	22.14	124.29	14	09	49.1	418.5	1	21	54	49.29	115.04	7	40	22.2	542.2
2	20	21	26.43	124.04	14	02	50.6	422.0	2	21	56	44.33	114.92	7	31	20.0	543.8
3	20	23	30.47	123.80	13	55	48.6	425.5	3	21	58	39.25	114.78	7	22	16.2	545.4
4	20	25	34.27	123.55	13	48	43.1	429.0	4	22	00	34.03	114.65	7	13	10.8	547.0
5	20	27	37.82	123.33	13	41	34.1	432.4	5	22	02	28.68	114.53	7	04	03.8	548.4
6	20	29	41.15	123.08	13	34	21.7	435.8	6	22	04	23.21	114.41	6	54	55.4	550.0
7	20	31	44.23	122.85	13	27	05.9	439.2	7	22	06	17.62	114.29	6	45	45.4	551.4
8	20	33	47.08	122.62	13	19	46.7	442.4	8	22	08	11.91	114.17	6	36	34.0	552.8
9	20	35	49.70	122.39	13	12	24.3	445.7	9	22	10	06.08	114.06	6	27	21.2	554.1
10	20	37	52.09	122.16	13	04	58.6	448.9	10	22	12	00.14	113.94	6	18	07.1	555.5
11	20	39	54.25	121.94	12	57	29.7	452.1	11	22	13	54.08	113.84	6	08	51.6	556.8
12	20	41	56.19	121.71	12	49	57.6	455.2	12	22	15	47.92	113.73	5	59	34.8	558.0
13	20	43	57.90	121.49	12	42	22.4	458.3	13	22	17	41.65	113.63	5	50	16.8	559.3
14	20	45	59.39	121.27	12	34	44.1	461.3	14	22	19	35.28	113.52	5	40	57.5	560.4
15	20	48	00.66	121.05	12	27	02.8	464.3	15	22	21	28.80	113.43	5	31	37.1	561.6
16	20	50	01.71	120.84	12	19	18.5	467.3	16	22	23	22.23	113.33	5	22	15.5	562.7
17	20	52	02.55	120.62	12	11	31.2	470.2	17	22	25	15.56	113.24	5	12	52.8	563.9
18	20	54	03.17	120.41	12	03	41.0	473.1	18	22	27	08.80	113.15	5	03	28.9	564.8
19	20	56	03.58	120.20	11	55	47.9	475.9	19	22	29	01.95	113.06	4	54	04.1	565.9
20	20	58	03.78	120.00	11	47	52.0	478.6	20	22	30	55.01	112.98	4	44	38.2	566.8
21	21	00	03.78	119.79	11	39	53.4	481.4	21	22	32	47.99	112.89	4	35	11.4	567.8
22	21	02	03.57	119.59	11	31	52.0	484.2	22	22	34	40.88	112.82	4	25	43.6	568.7
23	21	04	03.16	119.38	11	23	47.8	+486.7	23	22	36	33.70	112.74	4	16	14.9	+569.6
24	21	06	02.54		-11	15	41.1		24	22	38	26.44		-4	06	45.3	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
APRIL 15									APRIL 17									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	22	38	26.44	112.66	-4	06	45.3	+570.4	0	0	07	58.60	112.13	+	3	34	48.5	+570.3
1	22	40	19.10	112.59	3	57	14.9	571.2	1	0	09	50.73	112.19		3	44	18.8	569.4
2	22	42	11.69	112.52	3	47	43.7	572.0	2	0	11	42.92	112.24		3	53	48.2	568.6
3	22	44	04.21	112.46	3	38	11.7	572.7	3	0	13	35.16	112.29		4	03	16.8	567.6
4	22	45	56.67	112.39	3	28	39.0	573.4	4	0	15	27.45	112.35		4	12	44.4	566.7
5	22	47	49.06	112.34	3	19	05.6	574.1	5	0	17	19.80	112.41		4	22	11.1	565.7
6	22	49	41.40	112.27	3	09	31.5	574.7	6	0	19	12.21	112.47		4	31	36.8	564.6
7	22	51	33.67	112.22	2	59	56.8	575.4	7	0	21	04.68	112.53		4	41	01.4	563.6
8	22	53	25.89	112.16	2	50	21.4	575.9	8	0	22	57.21	112.59		4	50	25.0	562.5
9	22	55	18.05	112.12	2	40	45.5	576.4	9	0	24	49.80	112.67		4	59	47.5	561.4
10	22	57	10.17	112.06	2	31	09.1	576.9	10	0	26	42.47	112.73		5	09	08.9	560.2
11	22	59	02.23	112.02	2	21	32.2	577.3	11	0	28	35.20	112.80		5	18	29.1	559.0
12	23	00	54.25	111.98	2	11	54.9	577.8	12	0	30	28.00	112.88		5	27	48.1	557.7
13	23	02	46.23	111.94	2	02	17.1	578.2	13	0	32	20.88	112.96		5	37	05.8	556.5
14	23	04	38.17	111.90	1	52	38.9	578.6	14	0	34	13.84	113.03		5	46	22.3	555.1
15	23	06	30.07	111.87	1	43	00.3	578.8	15	0	36	06.87	113.11		5	55	37.4	553.9
16	23	08	21.94	111.83	1	33	21.5	579.2	16	0	37	59.98	113.20		6	04	51.3	552.4
17	23	10	13.77	111.81	1	23	42.3	579.4	17	0	39	53.18	113.28		6	14	03.7	551.0
18	23	12	05.58	111.78	1	14	02.9	579.7	18	0	41	46.46	113.37		6	23	14.7	549.5
19	23	13	57.36	111.75	1	04	23.2	579.8	19	0	43	39.83	113.45		6	32	24.2	548.1
20	23	15	49.11	111.73	0	54	43.4	580.0	20	0	45	33.28	113.55		6	41	32.3	546.5
21	23	17	40.84	111.72	0	45	03.4	580.1	21	0	47	26.83	113.64		6	50	38.8	544.9
22	23	19	32.56	111.69	0	35	23.3	580.1	22	0	49	20.47	113.73		6	59	43.7	543.4
23	23	21	24.25	111.68	-0	25	43.2	+580.3	23	0	51	14.20	113.83	+	7	08	47.1	+541.7
APRIL 16									APRIL 18									
0	23	23	15.93	111.68	-0	16	02.9	+580.2	0	0	53	08.03	113.93	+	7	17	48.8	+540.0
1	23	25	07.61	111.66	-0	06	22.7	580.2	1	0	55	01.96	114.03		7	26	48.8	538.3
2	23	26	59.27	111.65	+0	03	17.5	580.2	2	0	56	55.99	114.13		7	35	47.1	536.5
3	23	28	50.92	111.65	0	12	57.7	580.1	3	0	58	50.12	114.24		7	44	43.6	534.8
4	23	30	42.57	111.65	0	22	37.8	580.0	4	1	00	44.36	114.34		7	53	38.4	532.9
5	23	32	34.22	111.65	0	32	17.8	579.8	5	1	02	38.70	114.45		8	02	31.3	531.1
6	23	34	25.87	111.66	0	41	57.6	579.6	6	1	04	33.15	114.56		8	11	22.4	529.2
7	23	36	17.53	111.66	0	51	37.2	579.4	7	1	06	27.71	114.67		8	20	11.6	527.2
8	23	38	09.19	111.67	1	01	16.6	579.2	8	1	08	22.38	114.79		8	28	58.8	525.2
9	23	40	00.86	111.68	1	10	55.8	578.8	9	1	10	17.17	114.90		8	37	44.0	523.3
10	23	41	52.54	111.69	1	20	34.6	578.6	10	1	12	12.07	115.01		8	46	27.3	521.2
11	23	43	44.23	111.71	1	30	13.2	578.1	11	1	14	07.08	115.14		8	55	08.5	519.1
12	23	45	35.94	111.73	1	39	51.3	577.8	12	1	16	02.22	115.26		9	03	47.6	516.9
13	23	47	27.67	111.75	1	49	29.1	577.3	13	1	17	57.48	115.38		9	12	24.5	514.8
14	23	49	19.42	111.77	1	59	06.4	576.9	14	1	19	52.86	115.50		9	20	59.3	512.6
15	23	51	11.19	111.80	2	08	43.3	576.4	15	1	21	48.36	115.63		9	29	31.9	510.4
16	23	53	02.99	111.83	2	18	19.7	575.8	16	1	23	43.99	115.76		9	38	02.3	508.1
17	23	54	54.82	111.86	2	27	55.5	575.3	17	1	25	39.75	115.88		9	46	30.4	505.8
18	23	56	46.68	111.89	2	37	30.8	574.7	18	1	27	35.63	116.01		9	54	56.2	503.4
19	23	58	38.57	111.92	2	47	05.5	574.0	19	1	29	31.64	116.15		10	03	19.6	501.0
20	0	00	30.49	111.97	2	56	39.5	573.3	20	1	31	27.79	116.28		10	11	40.6	498.6
21	0	02	22.46	112.00	3	06	12.8	572.7	21	1	33	24.07	116.42		10	19	59.2	496.1
22	0	04	14.46	112.05	3	15	45.5	571.9	22	1	35	20.49	116.55		10	28	15.3	493.6
23	0	06	06.51	112.09	3	25	17.4	+571.1	23	1	37	17.04	116.69		10	36	28.9	+491.1
24	0	07	58.60		+3	34	48.5		24	1	39	13.73		+	10	44	40.0	

MOON, 1958

UNIVERSAL TIME

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Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
APRIL 19									APRIL 21								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	1	39	13.73	116.83	+10	44	40.0	+488.5	0	3	15	38.05	124.60	+16	15	08.6	+319.6
1	1	41	10.56	116.96	10	52	48.5	485.9	1	3	17	42.65	124.77	16	20	28.2	315.2
2	1	43	07.52	117.11	11	00	54.4	483.2	2	3	19	47.42	124.93	16	25	43.4	310.7
3	1	45	04.63	117.26	11	08	57.6	480.5	3	3	21	52.35	125.11	16	30	54.1	306.2
4	1	47	01.89	117.40	11	16	58.1	477.8	4	3	23	57.46	125.28	16	36	00.3	301.7
5	1	48	59.29	117.54	11	24	55.9	475.0	5	3	26	02.74	125.45	16	41	02.0	297.2
6	1	50	56.83	117.69	11	32	50.9	472.2	6	3	28	08.19	125.62	16	45	59.2	292.5
7	1	52	54.52	117.85	11	40	43.1	469.4	7	3	30	13.81	125.78	16	50	51.7	287.9
8	1	54	52.37	117.99	11	48	32.5	466.4	8	3	32	19.59	125.96	16	55	39.6	283.2
9	1	56	50.36	118.14	11	56	18.9	463.5	9	3	34	25.55	126.12	17	00	22.8	278.5
10	1	58	48.50	118.29	12	04	02.4	460.6	10	3	36	31.67	126.29	17	05	01.3	273.7
11	2	00	46.79	118.45	12	11	43.0	457.6	11	3	38	37.96	126.45	17	09	35.0	269.0
12	2	02	45.24	118.60	12	19	20.6	454.5	12	3	40	44.41	126.62	17	14	04.0	264.2
13	2	04	43.84	118.75	12	26	55.1	451.4	13	3	42	51.03	126.79	17	18	28.2	259.3
14	2	06	42.59	118.91	12	34	26.5	448.3	14	3	44	57.82	126.95	17	22	47.5	254.5
15	2	08	41.50	119.07	12	41	54.8	445.1	15	3	47	04.77	127.12	17	27	02.0	249.5
16	2	10	40.57	119.23	12	49	19.9	442.0	16	3	49	11.89	127.27	17	31	11.5	244.6
17	2	12	39.80	119.39	12	56	41.9	438.7	17	3	51	19.16	127.44	17	35	16.1	239.7
18	2	14	39.19	119.54	13	04	00.6	435.5	18	3	53	26.60	127.60	17	39	15.8	234.6
19	2	16	38.73	119.71	13	11	16.1	432.1	19	3	55	34.20	127.76	17	43	10.4	229.7
20	2	18	38.44	119.87	13	18	28.2	428.8	20	3	57	41.96	127.92	17	47	00.1	224.5
21	2	20	38.31	120.03	13	25	37.0	425.3	21	3	59	49.88	128.08	17	50	44.6	219.5
22	2	22	38.34	120.20	13	32	42.3	422.0	22	4	01	57.96	128.24	17	54	24.1	214.3
23	2	24	38.54	120.36	+13	39	44.3	+418.5	23	4	04	06.20	128.39	+17	57	58.4	+209.2
APRIL 20									APRIL 22								
0	2	26	38.90	120.52	+13	46	42.8	+415.0	0	4	06	14.59	128.55	+18	01	27.6	+204.0
1	2	28	39.42	120.69	13	53	37.8	411.4	1	4	08	23.14	128.70	18	04	51.6	198.8
2	2	30	40.11	120.86	14	00	29.2	407.9	2	4	10	31.84	128.86	18	08	10.4	193.6
3	2	32	40.97	121.02	14	07	17.1	404.2	3	4	12	40.70	129.01	18	11	24.0	188.2
4	2	34	41.99	121.19	14	14	01.3	400.6	4	4	14	49.71	129.15	18	14	32.2	183.0
5	2	36	43.18	121.36	14	20	41.9	396.9	5	4	16	58.86	129.31	18	17	35.2	177.7
6	2	38	44.54	121.52	14	27	18.8	393.2	6	4	19	08.17	129.46	18	20	32.9	172.3
7	2	40	46.06	121.70	14	33	52.0	389.4	7	4	21	17.63	129.60	18	23	25.2	166.9
8	2	42	47.76	121.86	14	40	21.4	385.6	8	4	23	27.23	129.75	18	26	12.1	161.6
9	2	44	49.62	122.03	14	46	47.0	381.7	9	4	25	36.98	129.89	18	28	53.7	156.1
10	2	46	51.65	122.21	14	53	08.7	377.9	10	4	27	46.87	130.04	18	31	29.8	150.6
11	2	48	53.86	122.37	14	59	26.6	373.9	11	4	29	56.91	130.18	18	34	00.4	145.1
12	2	50	56.23	122.54	15	05	40.5	370.0	12	4	32	07.09	130.31	18	36	25.5	139.7
13	2	52	58.77	122.72	15	11	50.5	366.0	13	4	34	17.40	130.46	18	38	45.2	134.1
14	2	55	01.49	122.88	15	17	56.5	361.9	14	4	36	27.86	130.59	18	40	59.3	128.6
15	2	57	04.37	123.06	15	23	58.4	357.9	15	4	38	38.45	130.73	18	43	07.9	122.9
16	2	59	07.43	123.23	15	29	56.3	353.8	16	4	40	49.18	130.86	18	45	10.8	117.4
17	3	01	10.66	123.40	15	35	50.1	349.6	17	4	43	00.04	131.00	18	47	08.2	111.7
18	3	03	14.06	123.57	15	41	39.7	345.5	18	4	45	11.04	131.12	18	48	59.9	106.1
19	3	05	17.63	123.74	15	47	25.2	341.3	19	4	47	22.16	131.26	18	50	46.0	100.4
20	3	07	21.37	123.91	15	53	06.5	336.9	20	4	49	33.42	131.38	18	52	26.4	94.8
21	3	09	25.28	124.09	15	58	43.4	332.8	21	4	51	44.80	131.51	18	54	01.2	89.0
22	3	11	29.37	124.25	16	04	16.2	328.3	22	4	53	56.31	131.63	18	55	30.2	83.2
23	3	13	33.62	124.43	16	09	44.5	+324.1	23	4	56	07.94	131.76	18	56	53.4	+77.5
24	3	15	38.05		+16	15	08.6		24	4	58	19.70		+18	58	10.9	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
APRIL 23									APRIL 25								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	4	58	19.70	131.87	+18	58	10.9	+ 71.8	0	6	45	31.42	135.46	+18	02	53.2	-218.5
1	5	00	31.57	132.00	18	59	22.7	65.9	1	6	47	46.88	135.50	17	59	14.7	224.5
2	5	02	43.57	132.11	19	00	28.6	60.1	2	6	50	02.38	135.52	17	55	30.2	230.7
3	5	04	55.68	132.22	19	01	28.7	54.3	3	6	52	17.90	135.55	17	51	39.5	236.7
4	5	07	07.90	132.35	19	02	23.0	48.5	4	6	54	33.45	135.58	17	47	42.8	242.7
5	5	09	20.25	132.45	19	03	11.5	42.6	5	6	56	49.03	135.60	17	43	40.1	248.8
6	5	11	32.70	132.56	19	03	54.1	36.6	6	6	59	04.63	135.63	17	39	31.3	254.9
7	5	13	45.26	132.67	19	04	30.7	30.8	7	7	01	20.26	135.65	17	35	16.4	260.9
8	5	15	57.93	132.78	19	05	01.5	24.9	8	7	03	35.91	135.66	17	30	55.5	266.8
9	5	18	10.71	132.88	19	05	26.4	19.0	9	7	05	51.57	135.69	17	26	28.7	272.9
10	5	20	23.59	132.98	19	05	45.4	12.9	10	7	08	07.26	135.71	17	21	55.8	278.9
11	5	22	36.57	133.09	19	05	58.3	7.1	11	7	10	22.97	135.72	17	17	16.9	284.8
12	5	24	49.66	133.18	19	06	05.4	+ 1.0	12	7	12	38.69	135.73	17	12	32.1	290.9
13	5	27	02.84	133.28	19	06	06.4	- 4.9	13	7	14	54.42	135.76	17	07	41.2	296.7
14	5	29	16.12	133.37	19	06	01.5	10.9	14	7	17	10.18	135.76	17	02	44.5	302.7
15	5	31	29.49	133.47	19	05	50.6	17.0	15	7	19	25.94	135.78	16	57	41.8	308.6
16	5	33	42.96	133.56	19	05	33.6	23.0	16	7	21	41.72	135.78	16	52	33.2	314.5
17	5	35	56.52	133.64	19	05	10.6	29.0	17	7	23	57.50	135.80	16	47	18.7	320.4
18	5	38	10.16	133.74	19	04	41.6	35.0	18	7	26	13.30	135.81	16	41	58.3	326.2
19	5	40	23.90	133.82	19	04	06.6	41.1	19	7	28	29.11	135.81	16	36	32.1	332.1
20	5	42	37.72	133.90	19	03	25.5	47.2	20	7	30	44.92	135.82	16	31	00.0	337.9
21	5	44	51.62	133.98	19	02	38.3	53.2	21	7	33	00.74	135.83	16	25	22.1	343.7
22	5	47	05.60	134.06	19	01	45.1	59.4	22	7	35	16.57	135.83	16	19	38.4	349.5
23	5	49	19.66	134.14	+19	00	45.7	- 65.4	23	7	37	32.40	135.84	+16	13	48.9	-355.2
APRIL 24									APRIL 26								
0	5	51	33.80	134.22	+18	59	40.3	- 71.5	0	7	39	48.24	135.84	+16	07	53.7	-361.0
1	5	53	48.02	134.29	18	58	28.8	77.6	1	7	42	04.08	135.84	16	01	52.7	366.8
2	5	56	02.31	134.36	18	57	11.2	83.8	2	7	44	19.92	135.85	15	55	45.9	372.4
3	5	58	16.67	134.43	18	55	47.4	89.8	3	7	46	35.77	135.85	15	49	33.5	378.1
4	6	00	31.10	134.50	18	54	17.6	96.0	4	7	48	51.62	135.85	15	43	15.4	383.7
5	6	02	45.60	134.56	18	52	41.6	102.1	5	7	51	07.47	135.85	15	36	51.7	389.4
6	6	05	00.16	134.63	18	50	59.5	108.2	6	7	53	23.32	135.85	15	30	22.3	394.9
7	6	07	14.79	134.68	18	49	11.3	114.4	7	7	55	39.17	135.85	15	23	47.4	400.6
8	6	09	29.47	134.75	18	47	16.9	120.5	8	7	57	55.02	135.85	15	17	06.8	406.0
9	6	11	44.22	134.81	18	45	16.4	126.6	9	8	00	10.87	135.84	15	10	20.8	411.6
10	6	13	59.03	134.86	18	43	09.8	132.7	10	8	02	26.71	135.85	15	03	29.2	417.1
11	6	16	13.89	134.92	18	40	57.1	138.9	11	8	04	42.56	135.85	14	56	32.1	422.6
12	6	18	28.81	134.97	18	38	38.2	145.1	12	8	06	58.41	135.84	14	49	29.5	428.0
13	6	20	43.78	135.02	18	36	13.1	151.2	13	8	09	14.25	135.84	14	42	21.5	433.4
14	6	22	58.80	135.07	18	33	41.9	157.3	14	8	11	30.09	135.84	14	35	08.1	438.8
15	6	25	13.87	135.12	18	31	04.6	163.4	15	8	13	45.93	135.84	14	27	49.3	444.1
16	6	27	28.99	135.16	18	28	21.2	169.6	16	8	16	01.77	135.83	14	20	25.2	449.5
17	6	29	44.15	135.21	18	25	31.6	175.7	17	8	18	17.60	135.83	14	12	55.7	454.7
18	6	31	59.36	135.24	18	22	35.9	181.8	18	8	20	33.43	135.83	14	05	21.0	460.0
19	6	34	14.60	135.29	18	19	34.1	188.0	19	8	22	49.26	135.83	13	57	41.0	465.2
20	6	36	29.89	135.33	18	16	26.1	194.0	20	8	25	05.09	135.83	13	49	55.8	470.4
21	6	38	45.22	135.36	18	13	12.1	200.2	21	8	27	20.92	135.82	13	42	05.4	475.6
22	6	41	00.58	135.40	18	09	51.9	206.3	22	8	29	36.74	135.82	13	34	09.8	480.7
23	6	43	15.98	135.44	18	06	25.6	-212.4	23	8	31	52.56	135.82	13	26	09.1	-485.7
24	6	45	31.42		+18	02	53.2		24	8	34	08.38		+13	18	03.4	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
APRIL 27									APRIL 29										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	8	34	08.38		+13	18	03.4	-490.8	0	10	23	01.06		+5	23	48.6	-679.3		
1	8	36	24.20	135.82		13	09	52.6	495.8	1	10	25	17.94	136.88		5	12	29.3	681.7
2	8	38	40.02	135.82		13	01	36.8	500.8	2	10	27	34.88	136.94		5	01	07.6	684.3
3	8	40	55.84	135.81		12	53	16.0	505.7	3	10	29	51.88	137.00		4	49	43.3	686.7
4	8	43	11.65	135.82		12	44	50.3	510.6	4	10	32	08.94	137.06		4	38	16.6	689.0
5	8	45	27.47	135.82		12	36	19.7	515.5	5	10	34	26.07	137.13		4	26	47.6	691.4
6	8	47	43.29	135.82		12	27	44.2	520.3	6	10	36	43.27	137.20		4	15	16.2	693.5
7	8	49	59.11	135.82		12	19	03.9	525.1	7	10	39	00.53	137.26		4	03	42.7	695.7
8	8	52	14.93	135.82		12	10	18.8	529.8	8	10	41	17.87	137.34		3	52	07.0	697.7
9	8	54	30.75	135.83		12	01	29.0	534.5	9	10	43	35.27	137.40		3	40	29.3	699.8
10	8	56	46.58	135.83		11	52	34.5	539.2	10	10	45	52.76	137.49		3	28	49.5	701.7
11	8	59	02.41	135.84		11	43	35.3	543.8	11	10	48	10.32	137.56		3	17	07.8	703.5
12	9	01	18.25	135.84		11	34	31.5	548.4	12	10	50	27.96	137.64		3	05	24.3	705.4
13	9	03	34.09	135.85		11	25	23.1	552.9	13	10	52	45.68	137.72		2	53	38.9	707.0
14	9	05	49.94	135.86		11	16	10.2	557.3	14	10	55	03.48	137.80		2	41	51.9	708.8
15	9	08	05.80	135.86		11	06	52.9	561.8	15	10	57	21.37	137.89		2	30	03.1	710.2
16	9	10	21.66	135.87		10	57	31.1	566.3	16	10	59	39.34	137.97		2	18	12.9	711.8
17	9	12	37.53	135.89		10	48	04.8	570.5	17	11	01	57.41	138.07		2	06	21.1	713.2
18	9	14	53.42	135.89		10	38	34.3	574.9	18	11	04	15.56	138.15		1	54	27.9	714.5
19	9	17	09.31	135.91		10	28	59.4	579.1	19	11	06	33.81	138.25		1	42	33.4	715.8
20	9	19	25.22	135.92		10	19	20.3	583.3	20	11	08	52.16	138.35		1	30	37.6	717.0
21	9	21	41.14	135.94		10	09	37.0	587.5	21	11	11	10.60	138.44		1	18	40.6	718.0
22	9	23	57.08	135.95		9	59	49.5	591.5	22	11	13	29.14	138.54		1	06	42.6	719.2
23	9	26	13.03	135.96		+ 9	49	58.0	-595.7	23	11	15	47.78	138.64		+0	54	43.4	-720.0
APRIL 28									APRIL 30										
0	9	28	28.99	135.99		+ 9	40	02.3	-599.6	0	11	18	06.52	138.74		+0	42	43.4	-721.0
1	9	30	44.98	136.01		9	30	02.7	603.7	1	11	20	25.38	138.86		0	30	42.4	721.7
2	9	33	00.99	136.02		9	19	59.0	607.5	2	11	22	44.33	138.95		0	18	40.7	722.5
3	9	35	17.01	136.05		9	09	51.5	611.4	3	11	25	03.40	139.07		+0	06	38.2	723.1
4	9	37	33.06	136.07		8	59	40.1	615.1	4	11	27	22.58	139.18		-0	05	24.9	723.6
5	9	39	49.13	136.10		8	49	25.0	619.0	5	11	29	41.87	139.29		0	17	28.5	724.1
6	9	42	05.23	136.12		8	39	06.0	622.6	6	11	32	01.28	139.41		0	29	32.6	724.5
7	9	44	21.35	136.16		8	28	43.4	626.3	7	11	34	20.80	139.52		0	41	37.1	724.8
8	9	46	37.51	136.18		8	18	17.1	629.8	8	11	36	40.44	139.64		0	53	41.9	725.0
9	9	48	53.69	136.21		8	07	47.3	633.4	9	11	39	00.21	139.77		1	05	46.9	725.1
10	9	51	09.90	136.24		7	57	13.9	636.8	10	11	41	20.09	139.88		1	17	52.0	725.2
11	9	53	26.14	136.28		7	46	37.1	640.3	11	11	43	40.10	140.01		1	29	57.2	725.2
12	9	55	42.42	136.32		7	35	56.8	643.6	12	11	46	00.24	140.14		1	42	02.4	725.0
13	9	57	58.74	136.35		7	25	13.2	647.0	13	11	48	20.51	140.27		1	54	07.4	724.8
14	10	00	15.09	136.39		7	14	26.2	650.2	14	11	50	40.90	140.39		2	06	12.2	724.5
15	10	02	31.48	136.43		7	03	36.0	653.3	15	11	53	01.43	140.53		2	18	16.7	724.2
16	10	04	47.91	136.48		6	52	42.7	656.5	16	11	55	22.09	140.66		2	30	20.9	723.7
17	10	07	04.39	136.52		6	41	46.2	659.6	17	11	57	42.89	140.80		2	42	24.6	723.1
18	10	09	20.91	136.56		6	30	46.6	662.5	18	12	00	03.82	140.93		2	54	27.7	722.5
19	10	11	37.47	136.62		6	19	44.1	665.5	19	12	02	24.89	141.07		3	06	30.2	721.7
20	10	13	54.09	136.66		6	08	38.6	668.3	20	12	04	46.10	141.21		3	18	31.9	721.0
21	10	16	10.75	136.71		5	57	30.3	671.2	21	12	07	07.45	141.35		3	30	32.9	720.0
22	10	18	27.46	136.77		5	46	19.1	673.9	22	12	09	28.95	141.50		3	42	32.9	719.0
23	10	20	44.23	136.83		5	35	05.2	-676.6	23	12	11	50.59	141.64		3	54	31.9	-718.0
24	10	23	01.06			+ 5	23	48.6		24	12	14	12.38	141.79		-4	06	29.9	

UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
MAY 1						MAY 3					
	h	m	s	s	° ' " "		h	m	s	s	° ' " "
0	12	14	12.38	141.93	- 4 06 29.9 -716.7	0	14	10	44.71	149.52	-12 49 47.7 -553.8
1	12	16	34.31	142.09	4 18 26.6 715.5	1	14	13	14.23	149.65	12 59 01.5 548.2
2	12	18	56.40	142.23	4 30 22.1 714.2	2	14	15	43.88	149.79	13 08 09.7 542.7
3	12	21	18.63	142.39	4 42 16.3 712.6	3	14	18	13.67	149.92	13 17 12.4 537.0
4	12	23	41.02	142.53	4 54 08.9 711.2	4	14	20	43.59	150.05	13 26 09.4 531.2
5	12	26	03.55	142.69	5 06 00.1 709.5	5	14	23	13.64	150.18	13 35 00.6 525.5
6	12	28	26.24	142.85	5 17 49.6 707.8	6	14	25	43.82	150.31	13 43 46.1 519.6
7	12	30	49.09	143.00	5 29 37.4 706.0	7	14	28	14.13	150.42	13 52 25.7 513.6
8	12	33	12.09	143.16	5 41 23.4 704.1	8	14	30	44.55	150.55	14 00 59.3 507.6
9	12	35	35.25	143.32	5 53 07.5 702.0	9	14	33	15.10	150.67	14 09 26.9 501.5
10	12	37	58.57	143.48	6 04 49.5 700.0	10	14	35	45.77	150.78	14 17 48.4 495.4
11	12	40	22.05	143.63	6 16 29.5 697.8	11	14	38	16.55	150.89	14 26 03.8 489.1
12	12	42	45.68	143.80	6 28 07.3 695.6	12	14	40	47.44	151.00	14 34 12.9 482.8
13	12	45	09.48	143.96	6 39 42.9 693.1	13	14	43	18.44	151.11	14 42 15.7 476.5
14	12	47	33.44	144.12	6 51 16.0 690.7	14	14	45	49.55	151.20	14 50 12.2 470.0
15	12	49	57.56	144.28	7 02 46.7 688.2	15	14	48	20.75	151.31	14 58 02.2 463.6
16	12	52	21.84	144.45	7 14 14.9 685.5	16	14	50	52.06	151.40	15 05 45.8 457.0
17	12	54	46.29	144.61	7 25 40.4 682.8	17	14	53	23.46	151.49	15 13 22.8 450.5
18	12	57	10.90	144.78	7 37 03.2 680.0	18	14	55	54.95	151.58	15 20 53.3 443.7
19	12	59	35.68	144.93	7 48 23.2 677.0	19	14	58	26.53	151.66	15 28 17.0 437.1
20	13	02	00.61	145.11	7 59 40.2 674.1	20	15	00	58.19	151.74	15 35 34.1 430.2
21	13	04	25.72	145.26	8 10 54.3 670.9	21	15	03	29.93	151.82	15 42 44.3 423.5
22	13	06	50.98	145.44	8 22 05.2 667.8	22	15	06	01.75	151.89	15 49 47.8 416.6
23	13	09	16.42	145.60	- 8 33 13.0 -664.4	23	15	08	33.64	151.96	-15 56 44.4 -409.6
MAY 2						MAY 4					
0	13	11	42.02	145.76	- 8 44 17.4 -661.1	0	15	11	05.60	152.02	-16 03 34.0 -402.6
1	13	14	07.78	145.93	8 55 18.5 657.6	1	15	13	37.62	152.08	16 10 16.6 395.6
2	13	16	33.71	146.09	9 06 16.1 654.1	2	15	16	09.70	152.14	16 16 52.2 388.5
3	13	18	59.80	146.26	9 17 10.2 650.4	3	15	18	41.84	152.19	16 23 20.7 381.4
4	13	21	26.06	146.43	9 28 00.6 646.7	4	15	21	14.03	152.23	16 29 42.1 374.3
5	13	23	52.49	146.58	9 38 47.3 642.9	5	15	23	46.26	152.28	16 35 56.4 367.0
6	13	26	19.07	146.75	9 49 30.2 638.9	6	15	26	18.54	152.32	16 42 03.4 359.7
7	13	28	45.82	146.92	10 00 09.1 634.9	7	15	28	50.86	152.34	16 48 03.1 352.5
8	13	31	12.74	147.07	10 10 44.0 630.9	8	15	31	23.20	152.38	16 53 55.6 345.2
9	13	33	39.81	147.24	10 21 14.9 626.7	9	15	33	55.58	152.40	16 59 40.8 337.8
10	13	36	07.05	147.39	10 31 41.6 622.3	10	15	36	27.98	152.42	17 05 18.6 330.4
11	13	38	34.44	147.56	10 42 03.9 618.1	11	15	39	00.40	152.43	17 10 49.0 322.9
12	13	41	02.00	147.72	10 52 22.0 613.6	12	15	41	32.83	152.44	17 16 11.9 315.5
13	13	43	29.72	147.87	11 02 35.6 609.0	13	15	44	05.27	152.45	17 21 27.4 308.0
14	13	45	57.59	148.03	11 12 44.6 604.5	14	15	46	37.72	152.45	17 26 35.4 300.4
15	13	48	25.62	148.19	11 22 49.1 599.7	15	15	49	10.17	152.44	17 31 35.8 292.9
16	13	50	53.81	148.34	11 32 48.8 595.0	16	15	51	42.61	152.43	17 36 28.7 285.3
17	13	53	22.15	148.49	11 42 43.8 590.1	17	15	54	15.04	152.41	17 41 14.0 277.8
18	13	55	50.64	148.65	11 52 33.9 585.2	18	15	56	47.45	152.40	17 45 51.8 270.1
19	13	58	19.29	148.79	12 02 19.1 580.1	19	15	59	19.85	152.37	17 50 21.9 262.4
20	14	00	48.08	148.94	12 11 59.2 575.0	20	16	01	52.22	152.34	17 54 44.3 254.8
21	14	03	17.02	149.09	12 21 34.2 569.8	21	16	04	24.56	152.30	17 58 59.1 247.1
22	14	05	46.11	149.23	12 31 04.0 564.6	22	16	06	56.86	152.26	18 03 06.2 239.4
23	14	08	15.34	149.37	-559.1	23	16	09	29.12	152.21	18 07 05.6 -231.7
24	14	10	44.71			24	16	12	01.33		-18 10 57.3

UNIVERSAL TIME

Hour	Right Ascension	Declination	Hour	Right Ascension	Declination
MAY 5			MAY 7		
0	h m s 16 12 01.33	° ' " " -18 10 57.3	0	h m s 18 11 14.28	° ' " " -18 46 39.0
1	16 14 33.49	-224.0	1	18 13 38.26	+133.5
2	16 17 05.60	216.2	2	18 16 01.96	140.2
3	16 19 37.64	208.4	3	18 18 25.40	146.8
4	16 22 09.62	200.7	4	18 20 48.56	153.4
5	16 24 41.52	193.0	5	18 23 11.44	159.9
6	16 27 13.35	185.1	6	18 25 34.05	166.4
7	16 29 45.09	177.4	7	18 27 56.37	172.8
8	16 32 16.75	169.7	8	18 30 18.42	179.2
9	16 34 48.31	161.8	9	18 32 40.18	185.5
10	16 37 19.77	154.1	10	18 35 01.65	191.8
11	16 39 51.13	146.4	11	18 37 22.83	198.0
12	16 42 22.38	138.5	12	18 39 43.72	204.2
13	16 44 53.52	130.8	13	18 42 04.32	210.3
14	16 47 24.53	123.1	14	18 44 24.62	216.4
15	16 49 55.42	115.3	15	18 46 44.63	222.4
16	16 52 26.19	107.5	16	18 49 04.34	228.3
17	16 54 56.81	99.9	17	18 51 23.75	234.2
18	16 57 27.30	92.1	18	18 53 42.87	240.1
19	16 59 57.65	84.4	19	18 56 01.68	245.9
20	17 02 27.84	76.8	20	18 58 20.19	251.6
21	17 04 57.88	69.2	21	19 00 38.39	257.3
22	17 07 27.77	61.4	22	19 02 56.29	263.0
23	17 09 57.48	53.9	23	19 05 13.89	268.5
		-46.2			+274.0
MAY 6			MAY 8		
0	17 12 27.03	-19 04 53.2	0	19 07 31.18	-17 24 15.3
1	17 14 56.40	-38.7	1	19 09 48.16	+279.5
2	17 17 25.60	31.1	2	19 12 04.84	284.9
3	17 19 54.61	23.6	3	19 14 21.21	290.3
4	17 22 23.44	16.1	4	19 16 37.27	295.5
5	17 24 52.07	8.6	5	19 18 53.02	300.8
6	17 27 20.51	-1.2	6	19 21 08.46	306.0
7	17 29 48.75	+6.3	7	19 23 23.59	311.1
8	17 32 16.79	13.6	8	19 25 38.42	316.2
9	17 34 44.61	21.0	9	19 27 52.94	321.2
10	17 37 12.22	28.3	10	19 30 07.15	326.2
11	17 39 39.62	35.6	11	19 32 21.04	331.1
12	17 42 06.79	42.8	12	19 34 34.64	335.9
13	17 44 33.74	50.1	13	19 36 47.92	340.8
14	17 47 00.46	57.2	14	19 39 00.89	345.4
15	17 49 26.94	64.4	15	19 41 13.56	350.2
16	17 51 53.19	71.5	16	19 43 25.92	354.8
17	17 54 19.20	78.6	17	19 45 37.98	359.3
18	17 56 44.97	85.6	18	19 47 49.73	363.9
19	17 59 10.49	92.5	19	19 50 01.18	368.3
20	18 01 35.76	99.5	20	19 52 12.32	372.8
21	18 04 00.78	106.4	21	19 54 23.16	377.1
22	18 06 25.54	113.2	22	19 56 33.70	381.4
23	18 08 50.04	120.1	23	19 58 43.94	385.6
24	18 11 14.28	+126.8	24	20 00 53.87	+389.9

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
MAY 9									MAY 11								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	20	00	53.87	129.64	-15	09	27.1	+393.9	0	21	39	33.19	117.63	-8	52	04.6	+534.3
1	20	03	03.51	129.34	15	02	53.2	398.1	1	21	41	30.82	117.45	8	43	10.3	536.1
2	20	05	12.85	129.05	14	56	15.1	402.1	2	21	43	28.27	117.25	8	34	14.2	538.0
3	20	07	21.90	128.75	14	49	33.0	406.1	3	21	45	25.52	117.08	8	25	16.2	539.6
4	20	09	30.65	128.46	14	42	46.9	409.9	4	21	47	22.60	116.90	8	16	16.6	541.4
5	20	11	39.11	128.17	14	35	57.0	413.9	5	21	49	19.50	116.72	8	07	15.2	543.1
6	20	13	47.28	127.87	14	29	03.1	417.7	6	21	51	16.22	116.55	7	58	12.1	544.6
7	20	15	55.15	127.59	14	22	05.4	421.4	7	21	53	12.77	116.38	7	49	07.5	546.3
8	20	18	02.74	127.30	14	15	04.0	425.2	8	21	55	09.15	116.22	7	40	01.2	547.9
9	20	20	10.04	127.02	14	07	58.8	428.8	9	21	57	05.37	116.04	7	30	53.3	549.3
10	20	22	17.06	126.73	14	00	50.0	432.5	10	21	59	01.41	115.89	7	21	44.0	550.9
11	20	24	23.79	126.45	13	53	37.5	435.9	11	22	00	57.30	115.73	7	12	33.1	552.2
12	20	26	30.24	126.17	13	46	21.6	439.5	12	22	02	53.03	115.58	7	03	20.9	553.7
13	20	28	36.41	125.90	13	39	02.1	443.0	13	22	04	48.61	115.42	6	54	07.2	555.1
14	20	30	42.31	125.61	13	31	39.1	446.4	14	22	06	44.03	115.27	6	44	52.1	556.4
15	20	32	47.92	125.34	13	24	12.7	449.7	15	22	08	39.30	115.13	6	35	35.7	557.7
16	20	34	53.26	125.07	13	16	43.0	453.0	16	22	10	34.43	114.99	6	26	18.0	558.9
17	20	36	58.33	124.80	13	09	10.0	456.3	17	22	12	29.42	114.84	6	16	59.1	560.2
18	20	39	03.13	124.54	13	01	33.7	459.4	18	22	14	24.26	114.71	6	07	38.9	561.4
19	20	41	07.67	124.26	12	53	54.3	462.7	19	22	16	18.97	114.58	5	58	17.5	562.5
20	20	43	11.93	124.00	12	46	11.6	465.7	20	22	18	13.55	114.44	5	48	55.0	563.6
21	20	45	15.93	123.75	12	38	25.9	468.9	21	22	20	07.99	114.32	5	39	31.4	564.7
22	20	47	19.68	123.48	12	30	37.0	471.8	22	22	22	02.31	114.19	5	30	06.7	565.8
23	20	49	23.16	123.22	-12	22	45.2	+474.8	23	22	23	56.50	114.07	-5	20	40.9	+566.7
MAY 10									MAY 12								
0	20	51	26.38	122.97	-12	14	50.4	+477.7	0	22	25	50.57	113.96	-5	11	14.2	+567.8
1	20	53	29.35	122.72	12	06	52.7	480.6	1	22	27	44.53	113.83	5	01	46.4	568.6
2	20	55	32.07	122.47	11	58	52.1	483.4	2	22	29	38.36	113.73	4	52	17.8	569.6
3	20	57	34.54	122.22	11	50	48.7	486.1	3	22	31	32.09	113.62	4	42	48.2	570.4
4	20	59	36.76	121.97	11	42	42.6	489.0	4	22	33	25.71	113.51	4	33	17.8	571.3
5	21	01	38.73	121.74	11	34	33.6	491.6	5	22	35	19.22	113.40	4	23	46.5	572.1
6	21	03	40.47	121.49	11	26	22.0	494.2	6	22	37	12.62	113.31	4	14	14.4	572.8
7	21	05	41.96	121.25	11	18	07.8	496.8	7	22	39	05.93	113.21	4	04	41.6	573.6
8	21	07	43.21	121.03	11	09	51.0	499.4	8	22	40	59.14	113.12	3	55	08.0	574.3
9	21	09	44.24	120.78	11	01	31.6	501.9	9	22	42	52.26	113.03	3	45	33.7	575.0
10	21	11	45.02	120.56	10	53	09.7	504.3	10	22	44	45.29	112.94	3	35	58.7	575.5
11	21	13	45.58	120.33	10	44	45.4	506.8	11	22	46	38.23	112.85	3	26	23.2	576.2
12	21	15	45.91	120.11	10	36	18.6	509.1	12	22	48	31.08	112.78	3	16	47.0	576.8
13	21	17	46.02	119.89	10	27	49.5	511.5	13	22	50	23.86	112.69	3	07	10.2	577.2
14	21	19	45.91	119.67	10	19	18.0	513.8	14	22	52	16.55	112.62	2	57	33.0	577.8
15	21	21	45.58	119.45	10	10	44.2	515.9	15	22	54	09.17	112.55	2	47	55.2	578.3
16	21	23	45.03	119.23	10	02	08.3	518.2	16	22	56	01.72	112.48	2	38	16.9	578.6
17	21	25	44.26	119.03	9	53	30.1	520.4	17	22	57	54.20	112.41	2	28	38.3	579.1
18	21	27	43.29	118.82	9	44	49.7	522.5	18	22	59	46.61	112.35	2	18	59.2	579.4
19	21	29	42.11	118.61	9	36	07.2	524.5	19	23	01	38.96	112.29	2	09	19.8	579.8
20	21	31	40.72	118.42	9	27	22.7	526.6	20	23	03	31.25	112.24	1	59	40.0	580.1
21	21	33	39.14	118.21	9	18	36.1	528.6	21	23	05	23.49	112.17	1	49	59.9	580.3
22	21	35	37.35	118.02	9	09	47.5	530.5	22	23	07	15.66	112.13	1	40	19.6	580.6
23	21	37	35.37	117.82	9	00	57.0	+532.4	23	23	09	07.79	112.08	1	30	39.0	+580.8
24	21	39	33.19		-8	52	04.6		24	23	10	59.87		-1	20	58.2	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
MAY 13									MAY 15									
	h	m	s	"	°	'	"	"		h	m	s	"	°	'	"	"	
0	23	10	59.87	112.04	-1	20	58.2	+581.0	0	0	40	40.71	113.26	+	6	17	05.6	+551.0
1	23	12	51.91	111.99	1	11	17.2	581.1	1	0	42	33.97	113.35	6	26	16.6	549.6	
2	23	14	43.90	111.96	1	01	36.1	581.2	2	0	44	27.32	113.45	6	35	26.2	548.0	
3	23	16	35.86	111.92	0	51	54.9	581.3	3	0	46	20.77	113.54	6	44	34.2	546.6	
4	23	18	27.78	111.89	0	42	13.6	581.3	4	0	48	14.31	113.63	6	53	40.8	545.0	
5	23	20	19.67	111.85	0	32	32.3	581.3	5	0	50	07.94	113.74	7	02	45.8	543.5	
6	23	22	11.52	111.83	0	22	51.0	581.3	6	0	52	01.68	113.84	7	11	49.3	541.8	
7	23	24	03.35	111.81	0	13	09.7	581.3	7	0	53	55.52	113.95	7	20	51.1	540.1	
8	23	25	55.16	111.78	-0	03	28.4	581.2	8	0	55	49.47	114.05	7	29	51.2	538.5	
9	23	27	46.94	111.77	+0	06	12.8	581.0	9	0	57	43.52	114.16	7	38	49.7	536.8	
10	23	29	38.71	111.75	0	15	53.8	580.9	10	0	59	37.68	114.27	7	47	46.5	535.0	
11	23	31	30.46	111.74	0	25	34.7	580.7	11	1	01	31.95	114.39	7	56	41.5	533.2	
12	23	33	22.20	111.73	0	35	15.4	580.5	12	1	03	26.34	114.51	8	05	34.7	531.3	
13	23	35	13.93	111.73	0	44	55.9	580.3	13	1	05	20.85	114.62	8	14	26.0	529.5	
14	23	37	05.63	111.72	0	54	36.2	580.0	14	1	07	15.47	114.74	8	23	15.5	527.6	
15	23	38	57.38	111.72	1	04	16.2	579.7	15	1	09	10.21	114.87	8	32	03.1	525.6	
16	23	40	49.10	111.72	1	13	55.9	579.3	16	1	11	05.08	114.99	8	40	48.7	523.7	
17	23	42	40.82	111.73	1	23	35.2	578.9	17	1	13	00.07	115.12	8	49	32.4	521.7	
18	23	44	32.55	111.73	1	33	14.1	578.6	18	1	14	55.19	115.24	8	58	14.1	519.6	
19	23	46	24.28	111.75	1	42	52.7	578.1	19	1	16	50.43	115.38	9	06	53.7	517.5	
20	23	48	16.03	111.76	1	52	30.8	577.6	20	1	18	45.81	115.51	9	15	31.2	515.4	
21	23	50	07.79	111.78	2	02	08.4	577.1	21	1	20	41.32	115.64	9	24	06.6	513.2	
22	23	51	59.57	111.80	2	11	45.5	576.6	22	1	22	36.96	115.79	9	32	39.8	511.0	
23	23	53	51.37	111.82	+2	21	22.1	+576.0	23	1	24	32.75	115.92	+	9	41	10.8	+508.8
MAY 14									MAY 16									
0	23	55	43.19	111.84	+2	30	58.1	+575.4	0	1	26	28.67	116.06	+	9	49	39.6	+506.5
1	23	57	35.03	111.88	2	40	33.5	574.8	1	1	28	24.73	116.20	9	58	06.1	504.2	
2	23	59	26.91	111.90	2	50	08.3	574.1	2	1	30	20.93	116.35	10	06	30.3	501.8	
3	0	01	18.81	111.94	2	59	42.4	573.4	3	1	32	17.28	116.50	10	14	52.1	499.5	
4	0	03	10.75	111.98	3	09	15.8	572.7	4	1	34	13.78	116.64	10	23	11.6	497.0	
5	0	05	02.73	112.01	3	18	48.5	571.9	5	1	36	10.42	116.79	10	31	28.6	494.6	
6	0	06	54.74	112.05	3	28	20.4	571.1	6	1	38	07.21	116.94	10	39	43.2	492.0	
7	0	08	46.79	112.10	3	37	51.5	570.3	7	1	40	04.15	117.10	10	47	55.2	489.6	
8	0	10	38.89	112.15	3	47	21.8	569.4	8	1	42	01.25	117.25	10	56	04.8	486.9	
9	0	12	31.04	112.20	3	56	51.2	568.5	9	1	43	58.50	117.41	11	04	11.7	484.3	
10	0	14	23.24	112.25	4	06	19.7	567.6	10	1	45	55.91	117.56	11	12	16.0	481.7	
11	0	16	15.49	112.30	4	15	47.3	566.6	11	1	47	53.47	117.73	11	20	17.7	479.0	
12	0	18	07.79	112.37	4	25	13.9	565.6	12	1	49	51.20	117.89	11	28	16.7	476.2	
13	0	20	00.16	112.42	4	34	39.5	564.6	13	1	51	49.09	118.04	11	36	12.9	473.4	
14	0	21	52.58	112.49	4	44	04.1	563.5	14	1	53	47.13	118.22	11	44	06.3	470.7	
15	0	23	45.07	112.55	4	53	27.6	562.4	15	1	55	45.35	118.38	11	51	57.0	467.8	
16	0	25	37.62	112.62	5	02	50.0	561.3	16	1	57	43.73	118.54	11	59	44.8	464.9	
17	0	27	30.24	112.69	5	12	11.3	560.1	17	1	59	42.27	118.71	12	07	29.7	461.9	
18	0	29	22.93	112.77	5	21	31.4	558.9	18	2	01	40.98	118.88	12	15	11.6	459.0	
19	0	31	15.70	112.84	5	30	50.3	557.7	19	2	03	39.86	119.06	12	22	50.6	456.0	
20	0	33	08.54	112.92	5	40	08.0	556.4	20	2	05	38.92	119.22	12	30	26.6	452.9	
21	0	35	01.46	113.00	5	49	24.4	555.1	21	2	07	38.14	119.40	12	37	59.5	449.9	
22	0	36	54.46	113.08	5	58	39.5	553.7	22	2	09	37.54	119.57	12	45	29.4	446.7	
23	0	38	47.54	113.17	6	07	53.2	+552.4	23	2	11	37.11	119.75	12	52	56.1	+443.5	
24	0	40	40.71		+6	17	05.6		24	2	13	36.86		+	13	00	19.6	

UNIVERSAL TIME

Hour	Right Ascension	Declination	Hour	Right Ascension	Declination
MAY 17			MAY 19		
	h m s s	° ' " "		h m s s	° ' " "
0	2 13 36.86 119.92	+13 00 19.6 +440.3	0	3 53 02.19 128.80	+17 40 00.1 +239.8
1	2 15 36.78 120.10	13 07 39.9 437.1	1	3 55 10.99 128.98	17 43 59.9 234.6
2	2 17 36.88 120.28	13 14 57.0 433.8	2	3 57 19.97 129.14	17 47 54.5 229.5
3	2 19 37.16 120.46	13 22 10.8 430.5	3	3 59 29.11 129.32	17 51 44.0 224.4
4	2 21 37.62 120.64	13 29 21.3 427.0	4	4 01 38.43 129.49	17 55 28.4 219.2
5	2 23 38.26 120.83	13 36 28.3 423.7	5	4 03 47.92 129.66	17 59 07.6 213.9
6	2 25 39.09 121.00	13 43 32.0 420.2	6	4 05 57.58 129.82	18 02 41.5 208.6
7	2 27 40.09 121.18	13 50 32.2 416.8	7	4 08 07.40 129.99	18 06 10.1 203.4
8	2 29 41.27 121.37	13 57 29.0 413.2	8	4 10 17.39 130.16	18 09 33.5 198.1
9	2 31 42.64 121.56	14 04 22.2 409.6	9	4 12 27.55 130.32	18 12 51.6 192.6
10	2 33 44.20 121.74	14 11 11.8 406.0	10	4 14 37.87 130.47	18 16 04.2 187.3
11	2 35 45.94 121.92	14 17 57.8 402.4	11	4 16 48.34 130.64	18 19 11.5 181.9
12	2 37 47.86 122.11	14 24 40.2 398.7	12	4 18 58.98 130.80	18 22 13.4 176.4
13	2 39 49.97 122.30	14 31 18.9 394.9	13	4 21 09.78 130.95	18 25 09.8 171.0
14	2 41 52.27 122.48	14 37 53.8 391.2	14	4 23 20.73 131.10	18 28 00.8 165.4
15	2 43 54.75 122.68	14 44 25.0 387.4	15	4 25 31.83 131.26	18 30 46.2 159.9
16	2 45 57.43 122.86	14 50 52.4 383.5	16	4 27 43.09 131.41	18 33 26.1 154.3
17	2 48 00.29 123.05	14 57 15.9 379.6	17	4 29 54.50 131.56	18 36 00.4 148.8
18	2 50 03.34 123.23	15 03 35.5 375.7	18	4 32 06.06 131.70	18 38 29.2 143.1
19	2 52 06.57 123.43	15 09 51.2 371.7	19	4 34 17.76 131.85	18 40 52.3 137.5
20	2 54 10.00 123.62	15 16 02.9 367.7	20	4 36 29.61 131.99	18 43 09.8 131.8
21	2 56 13.62 123.80	15 22 10.6 363.7	21	4 38 41.60 132.13	18 45 21.6 126.1
22	2 58 17.42 124.00	15 28 14.3 359.5	22	4 40 53.73 132.27	18 47 27.7 120.4
23	3 00 21.42 124.18	+15 34 13.8 +355.5	23	4 43 06.00 132.40	+18 49 28.1 +114.6
MAY 18			MAY 20		
	h m s s	° ' " "		h m s s	° ' " "
0	3 02 25.60 124.37	+15 40 09.3 +351.2	0	4 45 18.40 132.54	+18 51 22.7 +108.9
1	3 04 29.97 124.57	15 46 00.5 347.1	1	4 47 30.94 132.67	18 53 11.6 103.1
2	3 06 34.54 124.75	15 51 47.6 342.8	2	4 49 43.61 132.80	18 54 54.7 97.2
3	3 08 39.29 124.94	15 57 30.4 338.5	3	4 51 56.41 132.93	18 56 31.9 91.4
4	3 10 44.23 125.13	16 03 08.9 334.2	4	4 54 09.34 133.05	18 58 03.3 85.6
5	3 12 49.36 125.32	16 08 43.1 329.8	5	4 56 22.39 133.18	18 59 28.9 79.7
6	3 14 54.68 125.51	16 14 12.9 325.4	6	4 58 35.57 133.30	19 00 48.6 73.8
7	3 17 00.19 125.70	16 19 38.3 321.0	7	5 00 48.87 133.41	19 02 02.4 67.8
8	3 19 05.89 125.88	16 24 59.3 316.5	8	5 03 02.28 133.53	19 03 10.2 61.9
9	3 21 11.77 126.07	16 30 15.8 312.0	9	5 05 15.81 133.64	19 04 12.1 56.0
10	3 23 17.84 126.26	16 35 27.8 307.4	10	5 07 29.45 133.75	19 05 08.1 50.0
11	3 25 24.10 126.45	16 40 35.2 302.8	11	5 09 43.20 133.86	19 05 58.1 44.0
12	3 27 30.55 126.63	16 45 38.0 298.2	12	5 11 57.06 133.97	19 06 42.1 37.9
13	3 29 37.18 126.82	16 50 36.2 293.5	13	5 14 11.03 134.07	19 07 20.0 32.0
14	3 31 44.00 127.00	16 55 29.7 288.9	14	5 16 25.10 134.17	19 07 52.0 25.9
15	3 33 51.00 127.19	17 00 18.6 284.0	15	5 18 39.27 134.27	19 08 17.9 19.8
16	3 35 58.19 127.37	17 05 02.6 279.3	16	5 20 53.54 134.36	19 08 37.7 13.7
17	3 38 05.56 127.55	17 09 41.9 274.5	17	5 23 07.90 134.46	19 08 51.4 7.7
18	3 40 13.11 127.73	17 14 16.4 269.6	18	5 25 22.36 134.55	19 08 59.1 + 1.6
19	3 42 20.84 127.91	17 18 46.0 264.8	19	5 27 36.91 134.63	19 09 00.7 - 4.5
20	3 44 28.75 128.10	17 23 10.8 259.8	20	5 29 51.54 134.72	19 08 56.2 10.7
21	3 46 36.85 128.27	17 27 30.6 254.8	21	5 32 06.26 134.80	19 08 45.5 16.8
22	3 48 45.12 128.45	17 31 45.4 249.9	22	5 34 21.06 134.89	19 08 28.7 22.9
23	3 50 53.57 128.62	17 35 55.3 +244.8	23	5 36 35.95 134.95	19 08 05.8 - 29.1
24	3 53 02.19	+17 40 00.1	24	5 38 50.90	+19 07 36.7

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
MAY 21									MAY 23										
	h	m	s		°	'	"			h	m	s		°	'	"			
0	5	38	50.90	s	+19	07	36.7	"	0	7	27	29.96	s	+16	43	31.7	"		
1	5	41	05.94	135.04		19	07	01.4	-35.3	1	7	29	45.70	135.74		16	38	04.1	-327.6
2	5	43	21.04	135.10		19	06	20.0	41.4	2	7	32	01.41	135.71		16	32	30.7	333.4
3	5	45	36.22	135.18		19	05	32.3	47.7	3	7	34	17.08	135.67		16	26	51.6	339.1
4	5	47	51.46	135.24		19	04	38.5	53.8	4	7	36	32.72	135.64		16	21	06.8	344.8
5	5	50	06.77	135.31		19	03	38.5	60.0	5	7	38	48.31	135.59		16	15	16.4	350.4
6	5	52	22.13	135.36		19	02	32.3	66.2	6	7	41	03.87	135.56		16	09	20.3	356.1
7	5	54	37.56	135.43		19	01	20.0	72.3	7	7	43	19.39	135.52		16	03	18.6	361.7
8	5	56	53.04	135.48		19	00	01.4	78.6	8	7	45	34.87	135.48		15	57	11.3	367.3
9	5	59	08.58	135.54		18	58	36.6	84.8	9	7	47	50.31	135.44		15	50	58.5	372.8
10	6	01	24.16	135.58		18	57	05.5	91.1	10	7	50	05.71	135.40		15	44	40.2	378.3
11	6	03	39.80	135.64		18	55	28.3	97.2	11	7	52	21.06	135.35		15	38	16.4	383.8
12	6	05	55.48	135.68		18	53	44.9	103.4	12	7	54	36.36	135.30		15	31	47.1	389.3
13	6	08	11.20	135.72		18	51	55.2	109.7	13	7	56	51.62	135.26		15	25	12.5	394.6
14	6	10	26.96	135.76		18	49	59.3	115.9	14	7	59	06.84	135.22		15	18	32.4	400.1
15	6	12	42.76	135.80		18	47	57.2	122.1	15	8	01	22.01	135.17		15	11	46.9	405.5
16	6	14	58.60	135.84		18	45	48.9	128.3	16	8	03	37.13	135.12		15	04	56.2	410.7
17	6	17	14.47	135.87		18	43	34.4	134.5	17	8	05	52.20	135.07		14	58	00.1	416.1
18	6	19	30.37	135.90		18	41	13.7	140.7	18	8	08	07.23	135.03		14	50	58.8	421.3
19	6	21	46.29	135.92		18	38	46.8	146.9	19	8	10	22.20	134.97		14	43	52.2	426.6
20	6	24	02.24	135.95		18	36	13.7	153.1	20	8	12	37.13	134.93		14	36	40.5	431.7
21	6	26	18.22	135.98		18	33	34.4	159.3	21	8	14	52.01	134.88		14	29	23.6	436.9
22	6	28	34.21	135.99		18	30	48.9	165.5	22	8	17	06.84	134.83		14	22	01.5	442.1
23	6	30	50.23	136.02		+18	27	57.3	171.6	23	8	19	21.62	134.78		+14	14	34.4	447.1
			136.02					-177.9					134.73					-452.1	
MAY 22									MAY 24										
0	6	33	06.25		+18	24	59.4		0	8	21	36.35		+14	07	02.3			
1	6	35	22.29	136.04		18	21	55.4	-184.0	1	8	23	51.03	134.68		13	59	25.1	-457.2
2	6	37	38.35	136.06		18	18	45.3	190.1	2	8	26	05.66	134.63		13	51	43.0	462.1
3	6	39	54.41	136.06		18	15	29.0	196.3	3	8	28	20.24	134.58		13	43	55.9	467.1
4	6	42	10.47	136.06		18	12	06.5	202.5	4	8	30	34.77	134.53		13	36	04.0	471.9
5	6	44	26.54	136.07		18	08	38.0	208.5	5	8	32	49.25	134.48		13	28	07.1	476.9
6	6	46	42.62	136.08		18	05	03.3	214.7	6	8	35	03.68	134.43		13	20	05.5	481.6
7	6	48	58.69	136.07		18	01	22.5	220.8	7	8	37	18.06	134.38		13	11	59.1	486.4
8	6	51	14.76	136.07		17	57	35.7	226.8	8	8	39	32.39	134.33		13	03	48.0	491.1
9	6	53	30.83	136.07		17	53	42.8	232.9	9	8	41	46.67	134.28		12	55	32.1	495.9
10	6	55	46.88	136.05		17	49	43.8	239.0	10	8	44	00.91	134.24		12	47	11.6	500.5
11	6	58	02.93	136.05		17	45	38.8	245.0	11	8	46	15.09	134.18		12	38	46.5	505.1
12	7	00	18.97	136.04		17	41	27.7	251.1	12	8	48	29.23	134.14		12	30	16.8	509.7
13	7	02	35.00	136.03		17	37	10.7	257.0	13	8	50	43.32	134.09		12	21	42.6	514.2
14	7	04	51.01	136.01		17	32	47.6	263.1	14	8	52	57.37	134.05		12	13	04.0	518.6
15	7	07	07.01	136.00		17	28	18.6	269.0	15	8	55	11.37	134.00		12	04	20.8	523.2
16	7	09	22.99	135.98		17	23	43.6	275.0	16	8	57	25.32	133.95		12	04	20.8	527.5
17	7	11	38.95	135.96		17	19	02.7	280.9	17	8	59	39.23	133.91		11	55	33.3	531.9
18	7	13	54.88	135.93		17	14	15.8	286.9	18	9	01	53.10	133.87		11	46	41.4	536.1
19	7	16	10.80	135.92		17	09	23.1	292.7	19	9	04	06.92	133.82		11	37	45.3	540.5
20	7	18	26.69	135.89		17	04	24.5	298.6	20	9	06	20.70	133.78		11	28	44.8	544.6
21	7	20	42.55	135.86		16	59	20.0	304.5	21	9	08	34.45	133.75		11	19	40.2	548.8
22	7	22	58.38	135.83		16	54	09.7	310.3	22	9	10	48.15	133.70		11	10	31.4	553.0
23	7	25	14.19	135.81		16	48	53.6	316.1	23	9	13	01.81	133.66		11	01	18.4	557.0
24	7	27	29.96	135.77		+16	43	31.7	-321.9	24	9	15	15.44	133.63		10	52	01.4	-561.1
																+10	42	40.3	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination											
MAY 29													MAY 31												
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"								
0	12	51	03.35	139.79	-	7	04	00.9	-668.2	0	14	46	18.32	148.38	-14	50	32.6	-464.1							
1	12	53	23.14	139.97		7	15	09.1	665.8	1	14	48	46.70	148.53		14	58	16.7	458.0						
2	12	55	43.11	140.14		7	26	14.9	663.3	2	14	51	15.23	148.68		15	05	54.7	451.9						
3	12	58	03.25	140.31		7	37	18.2	660.8	3	14	53	43.91	148.82		15	13	26.6	445.7						
4	13	00	23.56	140.49		7	48	19.0	658.2	4	14	56	12.73	148.97		15	20	52.3	439.5						
5	13	02	44.05	140.67		7	59	17.2	655.4	5	14	58	41.70	149.11		15	28	11.8	433.2						
6	13	05	04.72	140.84		8	10	12.6	652.7	6	15	01	10.81	149.24		15	35	25.0	426.7						
7	13	07	25.56	141.03		8	21	05.3	649.8	7	15	03	40.05	149.38		15	42	31.7	420.4						
8	13	09	46.59	141.20		8	31	55.1	646.8	8	15	06	09.43	149.51		15	49	32.1	413.9						
9	13	12	07.79	141.39		8	42	41.9	643.8	9	15	08	38.94	149.64		15	56	26.0	407.3						
10	13	14	29.18	141.57		8	53	25.7	640.7	10	15	11	08.58	149.76		16	03	13.3	400.7						
11	13	16	50.75	141.76		9	04	06.4	637.4	11	15	13	38.34	149.89		16	09	54.0	394.1						
12	13	19	12.51	141.93		9	14	43.8	634.2	12	15	16	08.23	149.99		16	16	28.1	387.3						
13	13	21	34.44	142.13		9	25	18.0	630.9	13	15	18	38.22	150.12		16	22	55.4	380.6						
14	13	23	56.57	142.31		9	35	48.9	627.3	14	15	21	08.34	150.22		16	29	16.0	373.8						
15	13	26	18.88	142.49		9	46	16.2	623.9	15	15	23	38.56	150.33		16	35	29.8	366.9						
16	13	28	41.37	142.69		9	56	40.1	620.3	16	15	26	08.89	150.42		16	41	36.7	360.0						
17	13	31	04.06	142.86		10	07	00.4	616.6	17	15	28	39.31	150.53		16	47	36.7	353.1						
18	13	33	26.92	143.06		10	17	17.0	612.8	18	15	31	09.84	150.62		16	53	29.8	346.0						
19	13	35	49.98	143.24		10	27	29.8	608.9	19	15	33	40.46	150.71		16	59	15.8	339.0						
20	13	38	13.22	143.43		10	37	38.7	605.1	20	15	36	11.17	150.79		17	04	54.8	331.9						
21	13	40	36.65	143.62		10	47	43.8	601.0	21	15	38	41.96	150.87		17	10	26.7	324.8						
22	13	43	00.27	143.81		10	57	44.8	597.0	22	15	41	12.83	150.94		17	15	51.5	317.6						
23	13	45	24.08	144.00		-11	07	41.8	-592.8	23	15	43	43.77	151.02		-17	21	09.1	-310.4						
MAY 30													JUNE 1												
0	13	47	48.08	144.18		-11	17	34.6	-588.5	0	15	46	14.79	151.09		-17	26	19.5	-303.2						
1	13	50	12.26	144.37		11	27	23.1	584.2	1	15	48	45.88	151.14		17	31	22.7	295.8						
2	13	52	36.63	144.55		11	37	07.3	579.8	2	15	51	17.02	151.20		17	36	18.5	288.5						
3	13	55	01.18	144.74		11	46	47.1	575.4	3	15	53	48.22	151.26		17	41	07.0	281.2						
4	13	57	25.92	144.93		11	56	22.5	570.8	4	15	56	19.48	151.30		17	45	48.2	273.8						
5	13	59	50.85	145.11		12	05	53.3	566.1	5	15	58	50.78	151.35		17	50	22.0	266.3						
6	14	02	15.96	145.30		12	15	19.4	561.5	6	16	01	22.13	151.38		17	54	48.3	258.9						
7	14	04	41.26	145.48		12	24	40.9	556.6	7	16	03	53.51	151.41		17	59	07.2	251.5						
8	14	07	06.74	145.66		12	33	57.5	551.8	8	16	06	24.92	151.44		18	03	18.7	243.9						
9	14	09	32.40	145.85		12	43	09.3	546.9	9	16	08	56.36	151.46		18	07	22.6	236.4						
10	14	11	58.25	146.02		12	52	16.2	541.8	10	16	11	27.82	151.48		18	11	19.0	228.9						
11	14	14	24.27	146.21		13	01	18.0	536.8	11	16	13	59.30	151.49		18	15	07.9	221.3						
12	14	16	50.48	146.38		13	10	14.8	531.6	12	16	16	30.79	151.50		18	18	49.2	213.6						
13	14	19	16.86	146.55		13	19	06.4	526.3	13	16	19	02.29	151.50		18	22	22.8	206.1						
14	14	21	43.41	146.74		13	27	52.7	521.1	14	16	21	33.79	151.49		18	25	48.9	198.5						
15	14	24	10.15	146.91		13	36	33.8	515.6	15	16	24	05.28	151.48		18	29	07.4	190.7						
16	14	26	37.06	147.07		13	45	09.4	510.2	16	16	26	36.76	151.47		18	32	18.1	183.2						
17	14	29	04.13	147.25		13	53	39.6	504.7	17	16	29	08.23	151.45		18	35	21.3	175.4						
18	14	31	31.38	147.42		14	02	04.3	499.1	18	16	31	39.68	151.42		18	38	16.7	167.8						
19	14	33	58.80	147.58		14	10	23.4	493.5	19	16	34	11.10	151.39		18	41	04.5	160.1						
20	14	36	26.38	147.74		14	18	36.9	487.7	20	16	36	42.49	151.35		18	43	44.6	152.4						
21	14	38	54.12	147.91		14	26	44.6	481.9	21	16	39	13.84	151.31		18	46	17.0	144.7						
22	14	41	22.03	148.07		14	34	46.5	476.0	22	16	41	45.15	151.26		18	48	41.7	137.0						
23	14	43	50.10	148.22		14	42	42.5	-470.1	23	16	44	16.41	151.21		18	50	58.7	-129.3						
24	14	46	18.32			-14	50	32.6		24	16	46	47.62			-18	53	08.0							

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JUNE 2									JUNE 4								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	16	46	47.62	151.14	-18	53	08.0	-121.5	0	18	45	00.09	142.45	-18	10	04.1	+224.4
1	16	49	18.76	151.09	18	55	09.5	113.8	1	18	47	22.54	142.18	18	06	19.7	230.6
2	16	51	49.85	151.01	18	57	03.3	106.1	2	18	49	44.72	141.90	18	02	29.1	236.9
3	16	54	20.86	150.93	18	58	49.4	98.4	3	18	52	06.62	141.62	17	58	32.2	242.9
4	16	56	51.79	150.86	19	00	27.8	90.7	4	18	54	28.24	141.34	17	54	29.3	249.0
5	16	59	22.65	150.77	19	01	58.5	82.9	5	18	56	49.58	141.05	17	50	20.3	255.1
6	17	01	53.42	150.67	19	03	21.4	75.3	6	18	59	10.63	140.77	17	46	05.2	261.0
7	17	04	24.09	150.58	19	04	36.7	67.6	7	19	01	31.40	140.47	17	41	44.2	266.9
8	17	06	54.67	150.48	19	05	44.3	59.9	8	19	03	51.87	140.19	17	37	17.3	272.7
9	17	09	25.15	150.36	19	06	44.2	52.2	9	19	06	12.06	139.89	17	32	44.6	278.6
10	17	11	55.51	150.25	19	07	36.4	44.6	10	19	08	31.95	139.60	17	28	06.0	284.2
11	17	14	25.76	150.13	19	08	21.0	36.9	11	19	10	51.55	139.30	17	23	21.8	290.0
12	17	16	55.89	150.01	19	08	57.9	29.3	12	19	13	10.85	139.00	17	18	31.8	295.5
13	17	19	25.90	149.88	19	09	27.2	21.7	13	19	15	29.85	138.71	17	13	36.3	301.1
14	17	21	55.78	149.74	19	09	48.9	14.1	14	19	17	48.56	138.40	17	08	35.2	306.6
15	17	24	25.52	149.60	19	10	03.0	- 6.6	15	19	20	06.96	138.10	17	03	28.6	312.1
16	17	26	55.12	149.45	19	10	09.6	+ 1.1	16	19	22	25.06	137.80	16	58	16.5	317.4
17	17	29	24.57	149.31	19	10	08.5	8.5	17	19	24	42.86	137.50	16	52	59.1	322.8
18	17	31	53.88	149.15	19	10	00.0	16.1	18	19	27	00.36	137.19	16	47	36.3	328.0
19	17	34	23.03	148.99	19	09	43.9	23.5	19	19	29	17.55	136.89	16	42	08.3	333.3
20	17	36	52.02	148.82	19	09	20.4	30.9	20	19	31	34.44	136.58	16	36	35.0	338.3
21	17	39	20.84	148.65	19	08	49.5	38.4	21	19	33	51.02	136.28	16	30	56.7	343.5
22	17	41	49.49	148.47	19	08	11.1	45.8	22	19	36	07.30	135.97	16	25	13.2	348.5
23	17	44	17.96	148.30	-19	07	25.3	+ 53.2	23	19	38	23.27	135.66	-16	19	24.7	+353.5
JUNE 3									JUNE 5								
0	17	46	46.26	148.11	-19	06	32.1	+ 60.5	0	19	40	38.93	135.35	-16	13	31.2	+358.3
1	17	49	14.37	147.92	19	05	31.6	67.8	1	19	42	54.28	135.05	16	07	32.9	363.3
2	17	51	42.29	147.72	19	04	23.8	75.1	2	19	45	09.33	134.73	16	01	29.6	368.0
3	17	54	10.01	147.53	19	03	08.7	82.3	3	19	47	24.06	134.43	15	55	21.6	372.7
4	17	56	37.54	147.32	19	01	46.4	89.5	4	19	49	38.49	134.13	15	49	08.9	377.4
5	17	59	04.86	147.12	19	00	16.9	96.6	5	19	51	52.62	133.81	15	42	51.5	382.1
6	18	01	31.98	146.90	18	58	40.3	103.8	6	19	54	06.43	133.51	15	36	29.4	386.5
7	18	03	58.88	146.69	18	56	56.5	110.9	7	19	56	19.94	133.20	15	30	02.9	391.1
8	18	06	25.57	146.46	18	55	05.6	117.9	8	19	58	33.14	132.89	15	23	31.8	395.5
9	18	08	52.03	146.25	18	53	07.7	124.9	9	20	00	46.03	132.58	15	16	56.3	399.9
10	18	11	18.28	146.01	18	51	02.8	131.8	10	20	02	58.61	132.28	15	10	16.4	404.2
11	18	13	44.29	145.78	18	48	51.0	138.8	11	20	05	10.89	131.98	15	03	32.2	408.4
12	18	16	10.07	145.55	18	46	32.2	145.6	12	20	07	22.87	131.67	14	56	43.8	412.7
13	18	18	35.62	145.31	18	44	06.6	152.5	13	20	09	34.54	131.36	14	49	51.1	416.7
14	18	21	00.93	145.06	18	41	34.1	159.3	14	20	11	45.90	131.06	14	42	54.4	420.9
15	18	23	25.99	144.82	18	38	54.8	166.0	15	20	13	56.96	130.76	14	35	53.5	424.9
16	18	25	50.81	144.57	18	36	08.8	172.7	16	20	16	07.72	130.46	14	28	48.6	428.8
17	18	28	15.38	144.31	18	33	16.1	179.3	17	20	18	18.18	130.16	14	21	39.8	432.8
18	18	30	39.69	144.06	18	30	16.8	185.9	18	20	20	28.34	129.86	14	14	27.0	436.6
19	18	33	03.75	143.80	18	27	10.9	192.5	19	20	22	38.20	129.56	14	07	10.4	440.4
20	18	35	27.55	143.53	18	23	58.4	199.0	20	20	24	47.76	129.26	13	59	50.0	444.1
21	18	37	51.08	143.27	18	20	39.4	205.4	21	20	26	57.02	128.97	13	52	25.9	447.8
22	18	40	14.35	143.01	18	17	14.0	211.7	22	20	29	05.99	128.67	13	44	58.1	451.4
23	18	42	37.36	142.73	18	13	42.3	+218.2	23	20	31	14.66	128.38	13	37	26.7	+455.0
24	18	45	00.09		-18	10	04.1		24	20	33	23.04		-13	29	51.7	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JUNE 6									JUNE 8								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	20	33	23.04	128.09	-13	29	51.7	+458.5	0	22	11	00.96	116.73	-6	33	08.6	+567.2
1	20	35	31.13	127.80	13	22	13.2	461.9	1	22	12	57.69	116.56	6	23	41.4	568.4
2	20	37	38.93	127.51	13	14	31.3	465.4	2	22	14	54.25	116.39	6	14	13.0	569.6
3	20	39	46.44	127.23	13	06	45.9	468.6	3	22	16	50.64	116.23	6	04	43.4	570.6
4	20	41	53.67	126.94	12	58	57.3	472.0	4	22	18	46.87	116.08	5	55	12.8	571.7
5	20	44	00.61	126.65	12	51	05.3	475.2	5	22	20	42.95	115.91	5	45	41.1	572.7
6	20	46	07.26	126.38	12	43	10.1	478.4	6	22	22	38.86	115.77	5	36	08.4	573.6
7	20	48	13.64	126.09	12	35	11.7	481.4	7	22	24	34.63	115.61	5	26	34.8	574.6
8	20	50	19.73	125.82	12	27	10.3	484.6	8	22	26	30.24	115.47	5	17	00.2	575.5
9	20	52	25.55	125.54	12	19	05.7	487.6	9	22	28	25.71	115.32	5	07	24.7	576.3
10	20	54	31.09	125.27	12	10	58.1	490.5	10	22	30	21.03	115.18	4	57	48.4	577.2
11	20	56	36.36	125.00	12	02	47.6	493.4	11	22	32	16.21	115.05	4	48	11.2	578.0
12	20	58	41.36	124.73	11	54	34.2	496.3	12	22	34	11.26	114.91	4	38	33.2	578.7
13	21	00	46.09	124.46	11	46	17.9	499.1	13	22	36	06.17	114.78	4	28	54.5	579.4
14	21	02	50.55	124.19	11	37	58.8	501.9	14	22	38	00.95	114.65	4	19	15.1	580.1
15	21	04	54.74	123.94	11	29	36.9	504.5	15	22	39	55.60	114.53	4	09	35.0	580.7
16	21	06	58.68	123.67	11	21	12.4	507.2	16	22	41	50.13	114.40	3	59	54.3	581.3
17	21	09	02.35	123.41	11	12	45.2	509.8	17	22	43	44.53	114.29	3	50	13.0	581.9
18	21	11	05.76	123.16	11	04	15.4	512.4	18	22	45	38.82	114.17	3	40	31.1	582.5
19	21	13	08.92	122.90	10	55	43.0	514.8	19	22	47	32.99	114.06	3	30	48.6	582.9
20	21	15	11.82	122.66	10	47	08.2	517.4	20	22	49	27.05	113.95	3	21	05.7	583.4
21	21	17	14.48	122.40	10	38	30.8	519.7	21	22	51	21.00	113.85	3	11	22.3	583.8
22	21	19	16.88	122.16	10	29	51.1	522.0	22	22	53	14.85	113.75	3	01	38.5	584.3
23	21	21	19.04	121.92	-10	21	09.1	+524.4	23	22	55	08.60	113.64	-2	51	54.2	+584.5
JUNE 7									JUNE 9								
0	21	23	20.96	121.67	-10	12	24.7	+526.6	0	22	57	02.24	113.55	-2	42	09.7	+584.9
1	21	25	22.63	121.44	10	03	38.1	528.8	1	22	58	55.79	113.46	2	32	24.8	585.2
2	21	27	24.07	121.20	9	54	49.3	531.0	2	23	00	49.25	113.37	2	22	39.6	585.5
3	21	29	25.27	120.97	9	45	58.3	533.1	3	23	02	42.62	113.28	2	12	54.1	585.7
4	21	31	26.24	120.73	9	37	05.2	535.2	4	23	04	35.90	113.21	2	03	08.4	585.9
5	21	33	26.97	120.51	9	28	10.0	537.2	5	23	06	29.11	113.12	1	53	22.5	586.0
6	21	35	27.48	120.29	9	19	12.8	539.1	6	23	08	22.23	113.04	1	43	36.5	586.1
7	21	37	27.77	120.06	9	10	13.7	541.1	7	23	10	15.27	112.97	1	33	50.4	586.3
8	21	39	27.83	119.84	9	01	12.6	543.0	8	23	12	08.24	112.91	1	24	04.1	586.3
9	21	41	27.67	119.63	8	52	09.6	544.8	9	23	14	01.15	112.83	1	14	17.8	586.4
10	21	43	27.30	119.41	8	43	04.8	546.6	10	23	15	53.98	112.77	1	04	31.4	586.3
11	21	45	26.71	119.20	8	33	58.2	548.4	11	23	17	46.75	112.72	0	54	45.1	586.3
12	21	47	25.91	119.00	8	24	49.8	550.0	12	23	19	39.47	112.65	0	44	58.8	586.2
13	21	49	24.91	118.79	8	15	39.8	551.8	13	23	21	32.12	112.60	0	35	12.6	586.1
14	21	51	23.70	118.58	8	06	28.0	553.3	14	23	23	24.72	112.56	0	25	26.5	586.0
15	21	53	22.28	118.39	7	57	14.7	554.9	15	23	25	17.28	112.50	0	15	40.5	585.8
16	21	55	20.67	118.19	7	47	59.8	556.5	16	23	27	09.78	112.46	-0	05	54.7	585.7
17	21	57	18.86	118.00	7	38	43.3	557.9	17	23	29	02.24	112.42	+0	03	51.0	585.4
18	21	59	16.86	117.81	7	29	25.4	559.5	18	23	30	54.66	112.38	0	13	36.4	585.1
19	22	01	14.67	117.62	7	20	05.9	560.8	19	23	32	47.04	112.35	0	23	21.5	584.8
20	22	03	12.29	117.43	7	10	45.1	562.1	20	23	34	39.39	112.31	0	33	06.3	584.5
21	22	05	09.72	117.26	7	01	23.0	563.6	21	23	36	31.70	112.29	0	42	50.8	584.2
22	22	07	06.98	117.07	6	51	59.4	564.8	22	23	38	23.99	112.26	0	52	35.0	583.8
23	22	09	04.05	116.91	6	42	34.6	+566.0	23	23	40	16.25	112.24	1	02	18.8	+583.3
24	22	11	00.96		-	6	33	08.6	24	23	42	08.49		+1	12	02.1	

UNIVERSAL TIME

Hour	Right Ascension			Declination	Hour	Right Ascension			Declination
JUNE 14					JUNE 16				
0	h	m	s	° ' " "	0	h	m	s	° ' " "
0	2	47	17.48	+14 51 00.7	0	4	29	32.73	+18 35 24.5
1	2	49	20.45	14 57 26.0	1	4	31	45.37	18 38 00.6
2	2	51	23.63	15 03 47.5	2	4	33	58.19	18 40 31.0
3	2	53	27.01	15 10 05.1	3	4	36	11.19	18 42 55.7
4	2	55	30.60	15 16 18.8	4	4	38	24.36	18 45 14.7
5	2	57	34.40	15 22 28.5	5	4	40	37.70	18 47 27.9
6	2	59	38.40	15 28 34.2	6	4	42	51.20	18 49 35.4
7	3	01	42.61	15 34 35.8	7	4	45	04.87	18 51 37.0
8	3	03	47.03	15 40 33.4	8	4	47	18.70	18 53 32.8
9	3	05	51.66	15 46 26.8	9	4	49	32.70	18 55 22.6
10	3	07	56.50	15 52 16.0	10	4	51	46.85	18 57 06.6
11	3	10	01.54	15 58 01.1	11	4	54	01.16	18 58 44.7
12	3	12	06.80	16 03 41.9	12	4	56	15.62	19 00 16.8
13	3	14	12.26	16 09 18.4	13	4	58	30.23	19 01 42.9
14	3	16	17.93	16 14 50.5	14	5	00	45.00	19 03 02.9
15	3	18	23.82	16 20 18.3	15	5	02	59.91	19 04 17.0
16	3	20	29.91	16 25 41.7	16	5	05	14.96	19 05 25.0
17	3	22	36.22	16 31 00.6	17	5	07	30.15	19 06 26.9
18	3	24	42.73	16 36 15.0	18	5	09	45.48	19 07 22.7
19	3	26	49.45	16 41 24.9	19	5	12	00.95	19 08 12.4
20	3	28	56.38	16 46 30.3	20	5	14	16.55	19 08 56.0
21	3	31	03.52	16 51 31.0	21	5	16	32.28	19 09 33.4
22	3	33	10.87	16 56 27.0	22	5	18	48.14	19 10 04.6
23	3	35	18.43	+17 01 18.3	23	5	21	04.12	+19 10 29.6
			127.77	+286.7				136.10	+18.7
JUNE 15					JUNE 17				
0	3	37	26.20	+17 06 05.0	0	5	23	20.22	+19 10 48.3
1	3	39	34.17	17 10 46.8	1	5	25	36.44	19 11 00.9
2	3	41	42.35	17 15 23.8	2	5	27	52.78	19 11 07.2
3	3	43	50.73	17 19 56.0	3	5	30	09.23	19 11 07.1
4	3	45	59.32	17 24 23.3	4	5	32	25.78	19 11 00.9
5	3	48	08.12	17 28 45.7	5	5	34	42.45	19 10 48.3
6	3	50	17.12	17 33 03.0	6	5	36	59.22	19 10 29.4
7	3	52	26.32	17 37 15.4	7	5	39	16.09	19 10 04.1
8	3	54	35.73	17 41 22.8	8	5	41	33.05	19 09 32.5
9	3	56	45.33	17 45 25.0	9	5	43	50.11	19 08 54.6
10	3	58	55.14	17 49 22.2	10	5	46	07.26	19 08 10.3
11	4	01	05.14	17 53 14.2	11	5	48	24.50	19 07 19.6
12	4	03	15.35	17 57 01.0	12	5	50	41.82	19 06 22.6
13	4	05	25.74	18 00 42.5	13	5	52	59.23	19 05 19.1
14	4	07	36.34	18 04 18.8	14	5	55	16.71	19 04 09.3
15	4	09	47.13	18 07 49.8	15	5	57	34.27	19 02 53.0
16	4	11	58.11	18 11 15.5	16	5	59	51.90	19 01 30.4
17	4	14	09.29	18 14 35.8	17	6	02	09.60	19 00 01.3
18	4	16	20.65	18 17 50.6	18	6	04	27.37	18 58 25.8
19	4	18	32.20	18 21 00.1	19	6	06	45.20	18 56 43.8
20	4	20	43.94	18 24 04.1	20	6	09	03.08	18 54 55.5
21	4	22	55.86	18 27 02.5	21	6	11	21.03	18 53 00.7
22	4	25	07.97	18 29 55.4	22	6	13	39.02	18 50 59.5
23	4	27	20.26	18 32 42.8	23	6	15	57.07	18 48 51.9
24	4	29	32.73	+18 35 24.5	24	6	18	15.16	+18 46 37.8
			132.47	+161.7				138.09	-134.1

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JUNE 18									JUNE 20								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	6	18	15.16	138.14	+18	46	37.8	-140.5	0	8	08	41.92	137.04	+14	57	23.0	-429.8
1	6	20	33.30	138.17	18	44	17.3	146.9	1	8	10	58.96	136.97	14	50	13.2	435.1
2	6	22	51.47	138.22	18	41	50.4	153.3	2	8	13	15.93	136.90	14	42	58.1	440.3
3	6	25	09.69	138.24	18	39	17.1	159.8	3	8	15	32.83	136.83	14	35	37.8	445.6
4	6	27	27.93	138.28	18	36	37.3	166.1	4	8	17	49.66	136.75	14	28	12.2	450.8
5	6	29	46.21	138.31	18	33	51.2	172.6	5	8	20	06.41	136.68	14	20	41.4	455.9
6	6	32	04.52	138.33	18	30	58.6	178.9	6	8	22	23.09	136.60	14	13	05.5	461.0
7	6	34	22.85	138.35	18	27	59.7	185.3	7	8	24	39.69	136.53	14	05	24.5	466.0
8	6	36	41.20	138.37	18	24	54.4	191.7	8	8	26	56.22	136.45	13	57	38.5	471.1
9	6	38	59.57	138.39	18	21	42.7	198.1	9	8	29	12.67	136.37	13	49	47.4	476.0
10	6	41	17.96	138.39	18	18	24.6	204.4	10	8	31	29.04	136.29	13	41	51.4	480.9
11	6	43	36.35	138.41	18	15	00.2	210.8	11	8	33	45.33	136.22	13	33	50.5	485.8
12	6	45	54.76	138.42	18	11	29.4	217.1	12	8	36	01.55	136.14	13	25	44.7	490.6
13	6	48	13.18	138.41	18	07	52.3	223.4	13	8	38	17.69	136.06	13	17	34.1	495.3
14	6	50	31.59	138.42	18	04	08.9	229.8	14	8	40	33.75	135.97	13	09	18.8	500.2
15	6	52	50.01	138.42	18	00	19.1	236.0	15	8	42	49.72	135.90	13	00	58.6	504.7
16	6	55	08.43	138.41	17	56	23.1	242.3	16	8	45	05.62	135.82	12	52	33.9	509.4
17	6	57	26.84	138.41	17	52	20.8	248.6	17	8	47	21.44	135.74	12	44	04.5	514.0
18	6	59	45.25	138.39	17	48	12.2	254.8	18	8	49	37.18	135.66	12	35	30.5	518.6
19	7	02	03.64	138.39	17	43	57.4	261.0	19	8	51	52.84	135.58	12	26	51.9	523.0
20	7	04	22.03	138.36	17	39	36.4	267.2	20	8	54	08.42	135.50	12	18	08.9	527.4
21	7	06	40.39	138.35	17	35	09.2	273.4	21	8	56	23.92	135.42	12	09	21.5	531.8
22	7	08	58.74	138.33	17	30	35.8	279.5	22	8	58	39.34	135.34	12	00	29.7	536.1
23	7	11	17.07	138.30	+17	25	56.3	-285.7	23	9	00	54.68	135.26	+11	51	33.6	-540.4
JUNE 19									JUNE 21								
0	7	13	35.37	138.28	+17	21	10.6	-291.8	0	9	03	09.94	135.18	+11	42	33.2	-544.6
1	7	15	53.65	138.25	17	16	18.8	297.9	1	9	05	25.12	135.11	11	33	28.6	548.8
2	7	18	11.90	138.22	17	11	20.9	304.0	2	9	07	40.23	135.02	11	24	19.8	553.0
3	7	20	30.12	138.18	17	06	16.9	310.0	3	9	09	55.25	134.95	11	15	06.8	556.9
4	7	22	48.30	138.15	17	01	06.9	316.0	4	9	12	10.20	134.87	11	05	49.9	561.0
5	7	25	06.45	138.12	16	55	50.9	322.0	5	9	14	25.07	134.80	10	56	28.9	565.0
6	7	27	24.57	138.07	16	50	28.9	328.0	6	9	16	39.87	134.72	10	47	03.9	568.8
7	7	29	42.64	138.03	16	45	00.9	333.9	7	9	18	54.59	134.64	10	37	35.1	572.7
8	7	32	00.67	137.99	16	39	27.0	339.8	8	9	21	09.23	134.58	10	28	02.4	576.5
9	7	34	18.66	137.94	16	33	47.2	345.7	9	9	23	23.81	134.49	10	18	25.9	580.2
10	7	36	36.60	137.89	16	28	01.5	351.5	10	9	25	38.30	134.43	10	08	45.7	583.9
11	7	38	54.49	137.84	16	22	10.0	357.4	11	9	27	52.73	134.36	9	59	01.8	587.6
12	7	41	12.33	137.80	16	16	12.6	363.1	12	9	30	07.09	134.28	9	49	14.2	591.0
13	7	43	30.13	137.73	16	10	09.5	368.9	13	9	32	21.37	134.22	9	39	23.2	594.6
14	7	45	47.86	137.68	16	04	00.6	374.6	14	9	34	35.59	134.14	9	29	28.6	598.1
15	7	48	05.54	137.63	15	57	46.0	380.3	15	9	36	49.73	134.08	9	19	30.5	601.4
16	7	50	23.17	137.56	15	51	25.7	386.0	16	9	39	03.81	134.02	9	09	29.1	604.8
17	7	52	40.73	137.51	15	44	59.7	391.5	17	9	41	17.83	133.95	8	59	24.3	608.1
18	7	54	58.24	137.44	15	38	28.2	397.2	18	9	43	31.78	133.89	8	49	16.2	611.3
19	7	57	15.68	137.38	15	31	51.0	402.6	19	9	45	45.67	133.83	8	39	04.9	614.4
20	7	59	33.06	137.32	15	25	08.4	408.2	20	9	47	59.50	133.76	8	28	50.5	617.6
21	8	01	50.38	137.24	15	18	20.2	413.6	21	9	50	13.26	133.71	8	18	32.9	620.6
22	8	04	07.62	137.19	15	11	26.6	419.1	22	9	52	26.97	133.65	8	08	12.3	623.6
23	8	06	24.81	137.11	15	04	27.5	-424.5	23	9	54	40.62	133.60	7	57	48.7	-626.5
24	8	08	41.92		+14	57	23.0		24	9	56	54.22		+ 7	47	22.2	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
JUNE 22									JUNE 24									
0	h	m	s	s	°	'	"	"	0	h	m	s	s	°	'	"	"	
0	9	56	54.22	133.54	+7	47	22.2	-629.4	0	11	43	20.87	133.48	-	1	11	02.4	-693.4
1	9	59	07.76	133.48	7	36	52.8	632.2	1	11	45	34.35	133.54	1	22	35.8	693.0	
2	10	01	21.24	133.44	7	26	20.6	635.0	2	11	47	47.89	133.60	1	34	08.8	692.8	
3	10	03	34.68	133.39	7	15	45.6	637.6	3	11	50	01.49	133.66	1	45	41.6	692.3	
4	10	05	48.07	133.34	7	05	08.0	640.3	4	11	52	15.15	133.73	1	57	13.9	691.8	
5	10	08	01.41	133.30	6	54	27.7	642.8	5	11	54	28.88	133.81	2	08	45.7	691.4	
6	10	10	14.71	133.25	6	43	44.9	645.4	6	11	56	42.69	133.87	2	20	17.1	690.7	
7	10	12	27.96	133.21	6	32	59.5	647.8	7	11	58	56.56	133.95	2	31	47.8	690.0	
8	10	14	41.17	133.17	6	22	11.7	650.2	8	12	01	10.51	134.03	2	43	17.8	689.3	
9	10	16	54.34	133.14	6	11	21.5	652.5	9	12	03	24.54	134.11	2	54	47.1	688.4	
10	10	19	07.48	133.09	6	00	29.0	654.8	10	12	05	38.65	134.20	3	06	15.5	687.6	
11	10	21	20.57	133.07	5	49	34.2	656.9	11	12	07	52.85	134.27	3	17	43.1	686.6	
12	10	23	33.64	133.03	5	38	37.3	659.1	12	12	10	07.12	134.37	3	29	09.7	685.6	
13	10	25	46.67	133.00	5	27	38.2	661.2	13	12	12	21.49	134.46	3	40	35.3	684.5	
14	10	27	59.67	132.98	5	16	37.0	663.2	14	12	14	35.95	134.55	3	51	59.8	683.4	
15	10	30	12.65	132.95	5	05	33.8	665.1	15	12	16	50.50	134.65	4	03	23.2	682.1	
16	10	32	25.60	132.92	4	54	28.7	667.1	16	12	19	05.15	134.74	4	14	45.3	680.8	
17	10	34	38.52	132.91	4	43	21.6	668.8	17	12	21	19.89	134.85	4	26	06.1	679.5	
18	10	36	51.43	132.89	4	32	12.8	670.6	18	12	23	34.74	134.95	4	37	25.6	678.0	
19	10	39	04.32	132.87	4	21	02.2	672.4	19	12	25	49.69	135.05	4	48	43.6	676.5	
20	10	41	17.19	132.86	4	09	49.8	673.9	20	12	28	04.74	135.16	5	00	00.1	674.9	
21	10	43	30.05	132.84	3	58	35.9	675.5	21	12	30	19.90	135.27	5	11	15.0	673.3	
22	10	45	42.89	132.84	3	47	20.4	677.0	22	12	32	35.17	135.39	5	22	28.3	671.6	
23	10	47	55.73	132.83	+3	36	03.4	-678.5	23	12	34	50.56	135.49	-	5	33	39.9	-669.8
JUNE 23									JUNE 25									
0	10	50	08.56	132.82	+3	24	44.9	-679.9	0	12	37	06.05	135.62	-	5	44	49.7	-668.0
1	10	52	21.38	132.82	3	13	25.0	681.1	1	12	39	21.67	135.73	5	55	57.7	666.0	
2	10	54	34.20	132.83	3	02	03.9	682.4	2	12	41	37.40	135.86	6	07	03.7	664.0	
3	10	56	47.03	132.82	2	50	41.5	683.6	3	12	43	53.26	135.98	6	18	07.7	662.0	
4	10	58	59.85	132.83	2	39	17.9	684.8	4	12	46	09.24	136.10	6	29	09.7	659.8	
5	11	01	12.68	132.84	2	27	53.1	685.7	5	12	48	25.34	136.23	6	40	09.5	657.6	
6	11	03	25.52	132.85	2	16	27.4	686.8	6	12	50	41.57	136.37	6	51	07.1	655.4	
7	11	05	38.37	132.86	2	05	00.6	687.7	7	12	52	57.94	136.49	7	02	02.5	653.0	
8	11	07	51.23	132.88	1	53	32.9	688.6	8	12	55	14.43	136.62	7	12	55.5	650.6	
9	11	10	04.11	132.90	1	42	04.3	689.3	9	12	57	31.05	136.77	7	23	46.1	648.1	
10	11	12	17.01	132.91	1	30	35.0	690.1	10	12	59	47.82	136.89	7	34	34.2	645.5	
11	11	14	29.92	132.94	1	19	04.9	690.7	11	13	02	04.71	137.04	7	45	19.7	643.0	
12	11	16	42.86	132.96	1	07	34.2	691.4	12	13	04	21.75	137.18	7	56	02.7	640.2	
13	11	18	55.82	133.00	0	56	02.8	691.8	13	13	06	38.93	137.32	8	06	42.9	637.5	
14	11	21	08.82	133.02	0	44	31.0	692.4	14	13	08	56.25	137.47	8	17	20.4	634.6	
15	11	23	21.84	133.06	0	32	58.6	692.7	15	13	11	13.72	137.61	8	27	55.0	631.7	
16	11	25	34.90	133.09	0	21	25.9	693.1	16	13	13	31.33	137.76	8	38	26.7	628.8	
17	11	27	47.99	133.13	+0	09	52.8	693.3	17	13	15	49.09	137.91	8	48	55.5	625.7	
18	11	30	01.12	133.17	-0	01	40.5	693.6	18	13	18	07.00	138.06	8	59	21.2	622.6	
19	11	32	14.29	133.22	0	13	14.1	693.6	19	13	20	25.06	138.20	9	09	43.8	619.4	
20	11	34	27.51	133.27	0	24	47.7	693.8	20	13	22	43.26	138.37	9	20	03.2	616.2	
21	11	36	40.78	133.31	0	36	21.5	693.7	21	13	25	01.63	138.51	9	30	19.4	612.8	
22	11	38	54.09	133.36	0	47	55.2	693.7	22	13	27	20.14	138.68	9	40	32.2	609.5	
23	11	41	07.45	133.42	0	59	28.9	-693.5	23	13	29	38.82	138.83	9	50	41.7	-606.0	
24	11	43	20.87		-1	11	02.4		24	13	31	57.65		-10	00	47.7		

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JUNE 26									JUNE 28								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	13	31	57.65	138.98	-10	00	47.7	-602.4	0	15	26	10.99	146.41	-16	35	57.2	-356.8
1	13	34	16.63	139.15	10	10	50.1	598.9	1	15	28	37.40	146.53	16	41	54.0	350.2
2	13	36	35.78	139.31	10	20	49.0	595.1	2	15	31	03.93	146.65	16	47	44.2	343.8
3	13	38	55.09	139.47	10	30	44.1	591.5	3	15	33	30.58	146.76	16	53	28.0	337.1
4	13	41	14.56	139.62	10	40	35.6	587.6	4	15	35	57.34	146.86	16	59	05.1	330.5
5	13	43	34.18	139.80	10	50	23.2	583.7	5	15	38	24.20	146.97	17	04	35.6	323.9
6	13	45	53.98	139.95	11	00	06.9	579.8	6	15	40	51.17	147.07	17	09	59.5	317.1
7	13	48	13.93	140.12	11	09	46.7	575.8	7	15	43	18.24	147.17	17	15	16.6	310.3
8	13	50	34.05	140.28	11	19	22.5	571.7	8	15	45	45.41	147.27	17	20	26.9	303.6
9	13	52	54.33	140.45	11	28	54.2	567.6	9	15	48	12.68	147.35	17	25	30.5	296.8
10	13	55	14.78	140.61	11	38	21.8	563.3	10	15	50	40.03	147.45	17	30	27.3	289.8
11	13	57	35.39	140.78	11	47	45.1	559.0	11	15	53	07.48	147.52	17	35	17.1	283.0
12	13	59	56.17	140.95	11	57	04.1	554.7	12	15	55	35.00	147.61	17	40	00.1	276.1
13	14	02	17.12	141.11	12	06	18.8	550.3	13	15	58	02.61	147.68	17	44	36.2	269.0
14	14	04	38.23	141.28	12	15	29.1	545.8	14	16	00	30.29	147.76	17	49	05.2	262.1
15	14	06	59.51	141.44	12	24	34.9	541.2	15	16	02	58.05	147.83	17	53	27.3	255.0
16	14	09	20.95	141.61	12	33	36.1	536.6	16	16	05	25.88	147.89	17	57	42.3	248.0
17	14	11	42.56	141.78	12	42	32.7	532.0	17	16	07	53.77	147.95	18	01	50.3	240.8
18	14	14	04.34	141.94	12	51	24.7	527.2	18	16	10	21.72	148.01	18	05	51.1	233.8
19	14	16	26.28	142.11	13	00	11.9	522.3	19	16	12	49.73	148.06	18	09	44.9	226.6
20	14	18	48.39	142.28	13	08	54.2	517.5	20	16	15	17.79	148.10	18	13	31.5	219.4
21	14	21	10.67	142.44	13	17	31.7	512.6	21	16	17	45.89	148.15	18	17	10.9	212.3
22	14	23	33.11	142.60	13	26	04.3	507.5	22	16	20	14.04	148.19	18	20	43.2	205.0
23	14	25	55.71	142.77	-13	34	31.8	-502.5	23	16	22	42.23	148.23	-18	24	08.2	-197.8
JUNE 27									JUNE 29								
0	14	28	18.48	142.93	-13	42	54.3	-497.3	0	16	25	10.46	148.25	-18	27	26.0	-190.5
1	14	30	41.41	143.09	13	51	11.6	492.1	1	16	27	38.71	148.28	18	30	36.5	183.3
2	14	33	04.50	143.26	13	59	23.7	486.9	2	16	30	06.99	148.31	18	33	39.8	175.9
3	14	35	27.76	143.42	14	07	30.6	481.6	3	16	32	35.30	148.32	18	36	35.7	168.6
4	14	37	51.18	143.57	14	15	32.2	476.1	4	16	35	03.62	148.33	18	39	24.3	161.3
5	14	40	14.75	143.74	14	23	28.3	470.8	5	16	37	31.95	148.34	18	42	05.6	154.0
6	14	42	38.49	143.89	14	31	19.1	465.2	6	16	40	00.29	148.34	18	44	39.6	146.6
7	14	45	02.38	144.04	14	39	04.3	459.7	7	16	42	28.63	148.34	18	47	06.2	139.3
8	14	47	26.42	144.21	14	46	44.0	454.1	8	16	44	56.97	148.33	18	49	25.5	131.9
9	14	49	50.63	144.35	14	54	18.1	448.4	9	16	47	25.30	148.32	18	51	37.4	124.5
10	14	52	14.98	144.51	15	01	46.5	442.6	10	16	49	53.62	148.30	18	53	41.9	117.1
11	14	54	39.49	144.65	15	09	09.1	436.9	11	16	52	21.92	148.29	18	55	39.0	109.6
12	14	57	04.14	144.81	15	16	26.0	431.0	12	16	54	50.21	148.25	18	57	28.6	102.4
13	14	59	28.95	144.95	15	23	37.0	425.1	13	16	57	18.46	148.23	18	59	11.0	94.9
14	15	01	53.90	145.10	15	30	42.1	419.2	14	16	59	46.69	148.19	19	00	45.9	87.4
15	15	04	19.00	145.23	15	37	41.3	413.1	15	17	02	14.88	148.15	19	02	13.3	80.1
16	15	06	44.23	145.38	15	44	34.4	407.1	16	17	04	43.03	148.10	19	03	33.4	72.7
17	15	09	09.61	145.52	15	51	21.5	401.0	17	17	07	11.13	148.05	19	04	46.1	65.2
18	15	11	35.13	145.65	15	58	02.5	394.8	18	17	09	39.18	148.00	19	05	51.3	57.9
19	15	14	00.78	145.79	16	04	37.3	388.6	19	17	12	07.18	147.94	19	06	49.2	50.5
20	15	16	26.57	145.91	16	11	05.9	382.4	20	17	14	35.12	147.87	19	07	39.7	43.1
21	15	18	52.48	146.05	16	17	28.3	376.0	21	17	17	02.99	147.80	19	08	22.8	35.7
22	15	21	18.53	146.17	16	23	44.3	369.6	22	17	19	30.79	147.72	19	08	58.5	28.3
23	15	23	44.70	146.29	16	29	53.9	-363.3	23	17	21	58.51	147.65	19	09	26.8	-20.9
24	15	26	10.99		-16	35	57.2		24	17	24	26.16		-19	09	47.7	

MOON, 1958

UNIVERSAL TIME

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Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JUNE 30									JULY 2								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	17	24	26.16	147.56	-19	09	47.7	-13.6	0	19	19	32.43	138.61	-17	10	07.7	+304.9
1	17	26	53.72	147.47	19	10	01.3	-6.3	1	19	21	51.04	138.35	17	05	02.8	310.5
2	17	29	21.19	147.38	19	10	07.6	+1.1	2	19	24	09.39	138.09	16	59	52.3	316.0
3	17	31	48.57	147.28	19	10	06.5	8.4	3	19	26	27.48	137.82	16	54	36.3	321.4
4	17	34	15.85	147.17	19	09	58.1	15.7	4	19	28	45.30	137.55	16	49	14.9	326.8
5	17	36	43.02	147.06	19	09	42.4	23.0	5	19	31	02.85	137.29	16	43	48.1	332.2
6	17	39	10.08	146.95	19	09	19.4	30.3	6	19	33	20.14	137.02	16	38	15.9	337.4
7	17	41	37.03	146.84	19	08	49.1	37.5	7	19	35	37.16	136.75	16	32	38.5	342.7
8	17	44	03.87	146.70	19	08	11.6	44.7	8	19	37	53.91	136.48	16	26	55.8	347.7
9	17	46	30.57	146.59	19	07	26.9	51.9	9	19	40	10.39	136.21	16	21	08.1	352.9
10	17	48	57.16	146.45	19	06	35.0	59.1	10	19	42	26.60	135.93	16	15	15.2	358.0
11	17	51	23.61	146.31	19	05	35.9	66.3	11	19	44	42.53	135.66	16	09	17.2	362.9
12	17	53	49.92	146.17	19	04	29.6	73.3	12	19	46	58.19	135.38	16	03	14.3	367.9
13	17	56	16.09	146.02	19	03	16.3	80.5	13	19	49	13.57	135.11	15	57	06.4	372.7
14	17	58	42.11	145.88	19	01	55.8	87.6	14	19	51	28.68	134.83	15	50	53.7	377.6
15	18	01	07.99	145.72	19	00	28.2	94.6	15	19	53	43.51	134.55	15	44	36.1	382.3
16	18	03	33.71	145.56	18	58	53.6	101.6	16	19	55	58.06	134.28	15	38	13.8	387.0
17	18	05	59.27	145.40	18	57	12.0	108.7	17	19	58	12.34	134.00	15	31	46.8	391.7
18	18	08	24.67	145.23	18	55	23.3	115.5	18	20	00	26.34	133.72	15	25	15.1	396.2
19	18	10	49.90	145.06	18	53	27.8	122.5	19	20	02	40.06	133.44	15	18	38.9	400.8
20	18	13	14.96	144.88	18	51	25.3	129.4	20	20	04	53.50	133.16	15	11	58.1	405.2
21	18	15	39.84	144.71	18	49	15.9	136.2	21	20	07	06.66	132.89	15	05	12.9	409.6
22	18	18	04.55	144.52	18	46	59.7	143.1	22	20	09	19.55	132.60	14	58	23.3	414.0
23	18	20	29.07	144.34	-18	44	36.6	+149.8	23	20	11	32.15	132.33	-14	51	29.3	+418.3
JULY 1									JULY 3								
0	18	22	53.41	144.14	-18	42	06.8	+156.6	0	20	13	44.48	132.04	-14	44	31.0	+422.5
1	18	25	17.55	143.95	18	39	30.2	163.2	1	20	15	56.52	131.77	14	37	28.5	426.6
2	18	27	41.50	143.75	18	36	47.0	170.0	2	20	18	08.29	131.49	14	30	21.9	430.8
3	18	30	05.25	143.54	18	33	57.0	176.6	3	20	20	19.78	131.21	14	23	11.1	434.8
4	18	32	28.79	143.34	18	31	00.4	183.1	4	20	22	30.99	130.93	14	15	56.3	438.9
5	18	34	52.13	143.14	18	27	57.3	189.7	5	20	24	41.92	130.66	14	08	37.4	442.7
6	18	37	15.27	142.92	18	24	47.6	196.2	6	20	26	52.58	130.38	14	01	14.7	446.7
7	18	39	38.19	142.70	18	21	31.4	202.6	7	20	29	02.96	130.10	13	53	48.0	450.4
8	18	42	00.89	142.49	18	18	08.8	209.0	8	20	31	13.06	129.83	13	46	17.6	454.3
9	18	44	23.38	142.26	18	14	39.8	215.4	9	20	33	22.89	129.56	13	38	43.3	457.9
10	18	46	45.64	142.04	18	11	04.4	221.7	10	20	35	32.45	129.28	13	31	05.4	461.6
11	18	49	07.68	141.81	18	07	22.7	228.0	11	20	37	41.73	129.00	13	23	23.8	465.2
12	18	51	29.49	141.58	18	03	34.7	234.2	12	20	39	50.73	128.74	13	15	38.6	468.7
13	18	53	51.07	141.34	17	59	40.5	240.4	13	20	41	59.47	128.46	13	07	49.9	472.2
14	18	56	12.41	141.11	17	55	40.1	246.5	14	20	44	07.93	128.19	12	59	57.7	475.6
15	18	58	33.52	140.87	17	51	33.6	252.6	15	20	46	16.12	127.93	12	52	02.1	479.0
16	19	00	54.39	140.62	17	47	21.0	258.6	16	20	48	24.05	127.65	12	44	03.1	482.3
17	19	03	15.01	140.39	17	43	02.4	264.6	17	20	50	31.70	127.39	12	36	00.8	485.5
18	19	05	35.40	140.13	17	38	37.8	270.5	18	20	52	39.09	127.13	12	27	55.3	488.8
19	19	07	55.53	139.89	17	34	07.3	276.4	19	20	54	46.22	126.86	12	19	46.5	491.8
20	19	10	15.42	139.64	17	29	30.9	282.2	20	20	56	53.08	126.60	12	11	34.7	495.0
21	19	12	35.06	139.38	17	24	48.7	288.0	21	20	58	59.68	126.34	12	03	19.7	498.0
22	19	14	54.44	139.12	17	20	00.7	293.6	22	21	01	06.02	126.07	11	55	01.7	500.9
23	19	17	13.56	138.87	17	15	07.1	+299.4	23	21	03	12.09	125.82	11	46	40.8	+503.9
24	19	19	32.43		-17	10	07.7		24	21	05	17.91		-11	38	16.9	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JULY 4									JULY 6								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	21	05	17.91	125.57	-11	38	16.9	+506.7	0	22	41	34.46	115.88	-4	14	41.2	+586.0
1	21	07	23.48	125.30	11	29	50.2	509.6	1	22	43	30.34	115.75	4	04	55.2	586.6
2	21	09	28.78	125.06	11	21	20.6	512.2	2	22	45	26.09	115.61	3	55	08.6	587.0
3	21	11	33.84	124.80	11	12	48.4	515.0	3	22	47	21.70	115.48	3	45	21.6	587.6
4	21	13	38.64	124.56	11	04	13.4	517.7	4	22	49	17.18	115.35	3	35	34.0	588.1
5	21	15	43.20	124.31	10	55	35.7	520.2	5	22	51	12.53	115.23	3	25	45.9	588.4
6	21	17	47.51	124.06	10	46	55.5	522.8	6	22	53	07.76	115.10	3	15	57.5	588.8
7	21	19	51.57	123.81	10	38	12.7	525.2	7	22	55	02.86	114.99	3	06	08.7	589.2
8	21	21	55.38	123.58	10	29	27.5	527.7	8	22	56	57.85	114.88	2	56	19.5	589.5
9	21	23	58.96	123.34	10	20	39.8	530.1	9	22	58	52.73	114.76	2	46	30.0	589.8
10	21	26	02.30	123.09	10	11	49.7	532.4	10	23	00	47.49	114.65	2	36	40.2	590.0
11	21	28	05.39	122.86	10	02	57.3	534.7	11	23	02	42.14	114.55	2	26	50.2	590.1
12	21	30	08.25	122.63	9	54	02.6	536.9	12	23	04	36.69	114.44	2	17	00.1	590.4
13	21	32	10.88	122.40	9	45	05.7	539.1	13	23	06	31.13	114.34	2	07	09.7	590.5
14	21	34	13.28	122.17	9	36	06.6	541.2	14	23	08	25.47	114.25	1	57	19.2	590.5
15	21	36	15.45	121.94	9	27	05.4	543.3	15	23	10	19.72	114.15	1	47	28.7	590.6
16	21	38	17.39	121.71	9	18	02.1	545.3	16	23	12	13.87	114.06	1	37	38.1	590.6
17	21	40	19.10	121.50	9	08	56.8	547.4	17	23	14	07.93	113.98	1	27	47.5	590.6
18	21	42	20.60	121.27	8	59	49.4	549.2	18	23	16	01.91	113.88	1	17	56.9	590.6
19	21	44	21.87	121.05	8	50	40.2	551.1	19	23	17	55.79	113.81	1	08	06.3	590.4
20	21	46	22.92	120.84	8	41	29.1	553.0	20	23	19	49.60	113.73	0	58	15.9	590.2
21	21	48	23.76	120.63	8	32	16.1	554.7	21	23	21	43.33	113.65	0	48	25.5	590.0
22	21	50	24.39	120.42	8	23	01.4	556.5	22	23	23	36.98	113.58	0	38	35.3	589.7
23	21	52	24.81	120.20	- 8	13	44.9	+558.1	23	23	25	30.56	113.51	-0	28	45.3	+589.7
JULY 5									JULY 7								
0	21	54	25.01	120.01	- 8	04	26.8	+559.9	0	23	27	24.07	113.45	-0	18	55.6	+589.6
1	21	56	25.02	119.80	7	55	06.9	561.4	1	23	29	17.52	113.38	-0	09	06.0	589.2
2	21	58	24.82	119.60	7	45	45.5	562.9	2	23	31	10.90	113.32	+0	00	43.2	588.9
3	22	00	24.42	119.40	7	36	22.6	564.5	3	23	33	04.22	113.26	0	10	32.1	588.5
4	22	02	23.82	119.20	7	26	58.1	565.9	4	23	34	57.48	113.22	0	20	20.6	588.1
5	22	04	23.02	119.02	7	17	32.2	567.3	5	23	36	50.70	113.15	0	30	08.7	587.8
6	22	06	22.04	118.82	7	08	04.9	568.7	6	23	38	43.85	113.12	0	39	56.5	587.2
7	22	08	20.86	118.64	6	58	36.2	570.0	7	23	40	36.97	113.06	0	49	43.7	586.8
8	22	10	19.50	118.45	6	49	06.2	571.3	8	23	42	30.03	113.03	0	59	30.5	586.2
9	22	12	17.95	118.27	6	39	34.9	572.5	9	23	44	23.06	112.98	1	09	16.7	585.7
10	22	14	16.22	118.09	6	30	02.4	573.8	10	23	46	16.04	112.96	1	19	02.4	585.1
11	22	16	14.31	117.91	6	20	28.6	574.8	11	23	48	09.00	112.91	1	28	47.5	584.5
12	22	18	12.22	117.74	6	10	53.8	576.0	12	23	50	01.91	112.89	1	38	32.0	583.8
13	22	20	09.96	117.57	6	01	17.8	577.0	13	23	51	54.80	112.87	1	48	15.8	583.2
14	22	22	07.53	117.41	5	51	40.8	578.1	14	23	53	47.67	112.84	1	57	59.0	582.4
15	22	24	04.94	117.23	5	42	02.7	579.0	15	23	55	40.51	112.82	2	07	41.4	581.7
16	22	26	02.17	117.08	5	32	23.7	580.0	16	23	57	33.33	112.80	2	17	23.1	580.9
17	22	27	59.25	116.91	5	22	43.7	580.9	17	23	59	26.13	112.79	2	27	04.0	580.1
18	22	29	56.16	116.76	5	13	02.8	581.7	18	0	01	18.92	112.78	2	36	44.1	579.2
19	22	31	52.92	116.60	5	03	21.1	582.5	19	0	03	11.70	112.77	2	46	23.3	578.4
20	22	33	49.52	116.46	4	53	38.6	583.3	20	0	05	04.47	112.76	2	56	01.7	577.7
21	22	35	45.98	116.30	4	43	55.3	584.0	21	0	06	57.23	112.76	3	05	39.2	576.8
22	22	37	42.28	116.16	4	34	11.3	584.8	22	0	08	49.99	112.77	3	15	15.7	575.5
23	22	39	38.44	116.02	4	24	26.5	+585.3	23	0	10	42.76	112.77	3	24	51.3	+574.5
24	22	41	34.46		- 4	14	41.2		24	0	12	35.53		+3	34	25.8	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
JULY 8									JULY 10										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	0	12	35.53	112.77	+	3	34	25.8	+573.5	0	1	43	50.69	116.49	+10	44	19.2	+487.3	
1	0	14	28.30	112.79		3	43	59.3	572.5	1	1	45	47.18	116.64		10	52	26.5	484.7
2	0	16	21.09	112.80		3	53	31.8	571.4	2	1	47	43.82	116.78		11	00	31.2	482.0
3	0	18	13.89	112.82		4	03	03.2	570.2	3	1	49	40.60	116.93		11	08	33.2	479.4
4	0	20	06.71	112.83		4	12	33.4	569.1	4	1	51	37.53	117.08		11	16	32.6	476.7
5	0	21	59.54	112.86		4	22	02.5	567.9	5	1	53	34.61	117.23		11	24	29.3	474.0
6	0	23	52.40	112.88		4	31	30.4	566.7	6	1	55	31.84	117.38		11	32	23.3	471.2
7	0	25	45.28	112.91		4	40	57.1	565.5	7	1	57	29.22	117.54		11	40	14.5	468.5
8	0	27	38.19	112.95		4	50	22.6	564.1	8	1	59	26.76	117.69		11	48	03.0	465.6
9	0	29	31.14	112.97		4	59	46.7	562.9	9	2	01	24.45	117.86		11	55	48.6	462.7
10	0	31	24.11	113.02		5	09	09.6	561.5	10	2	03	22.31	118.01		12	03	31.3	459.8
11	0	33	17.13	113.05		5	18	31.1	560.1	11	2	05	20.32	118.18		12	11	11.1	456.9
12	0	35	10.18	113.10		5	27	51.2	558.8	12	2	07	18.50	118.35		12	18	48.0	454.0
13	0	37	03.28	113.14		5	37	10.0	557.3	13	2	09	16.85	118.51		12	26	22.0	450.9
14	0	38	56.42	113.19		5	46	27.3	555.8	14	2	11	15.36	118.69		12	33	52.9	447.9
15	0	40	49.61	113.24		5	55	43.1	554.4	15	2	13	14.05	118.86		12	41	20.8	444.8
16	0	42	42.85	113.30		6	04	57.5	552.8	16	2	15	12.91	119.03		12	48	45.6	441.7
17	0	44	36.15	113.36		6	14	10.3	551.3	17	2	17	11.94	119.20		12	56	07.3	438.5
18	0	46	29.51	113.41		6	23	21.6	549.6	18	2	19	11.14	119.39		13	03	25.8	435.4
19	0	48	22.92	113.48		6	32	31.2	548.1	19	2	21	10.53	119.56		13	10	41.2	432.1
20	0	50	16.40	113.55		6	41	39.3	546.4	20	2	23	10.09	119.75		13	17	53.3	428.9
21	0	52	09.95	113.61		6	50	45.7	544.7	21	2	25	09.84	119.93		13	25	02.2	425.5
22	0	54	03.56	113.68		6	59	50.4	543.1	22	2	27	09.77	120.11		13	32	07.7	422.3
23	0	55	57.24	113.77	+	7	08	53.5	+541.2	23	2	29	09.88	120.30	+13	39	10.0	+418.9	
JULY 9									JULY 11										
0	0	57	51.01	113.83	+	7	17	54.7	+539.5	0	2	31	10.18	120.49	+13	46	08.9	+415.4	
1	0	59	44.84	113.92		7	26	54.2	537.7	1	2	33	10.67	120.68		13	53	04.3	412.0
2	1	01	38.76	114.00		7	35	51.9	535.8	2	2	35	11.35	120.87		13	59	56.3	408.6
3	1	03	32.76	114.09		7	44	47.7	534.0	3	2	37	12.22	121.06		14	06	44.9	405.0
4	1	05	26.85	114.17		7	53	41.7	532.1	4	2	39	13.28	121.26		14	13	29.9	401.5
5	1	07	21.02	114.27		8	02	33.8	530.1	5	2	41	14.54	121.45		14	20	11.4	397.8
6	1	09	15.29	114.36		8	11	23.9	528.2	6	2	43	15.99	121.65		14	26	49.2	394.3
7	1	11	09.65	114.45		8	20	12.1	526.2	7	2	45	17.64	121.85		14	33	23.5	390.6
8	1	13	04.10	114.56		8	28	58.3	524.1	8	2	47	19.49	122.05		14	39	54.1	386.8
9	1	14	58.66	114.66		8	37	42.4	522.1	9	2	49	21.54	122.24		14	46	20.9	383.1
10	1	16	53.32	114.76		8	46	24.5	520.0	10	2	51	23.78	122.46		14	52	44.0	379.4
11	1	18	48.08	114.87		8	55	04.5	517.9	11	2	53	26.24	122.65		14	59	03.4	375.5
12	1	20	42.95	114.98		9	03	42.4	515.7	12	2	55	28.89	122.86		15	05	18.9	371.6
13	1	22	37.93	115.09		9	12	18.1	513.5	13	2	57	31.75	123.07		15	11	30.5	367.8
14	1	24	33.02	115.21		9	20	51.6	511.3	14	2	59	34.82	123.27		15	17	38.3	363.8
15	1	26	28.23	115.32		9	29	22.9	509.1	15	3	01	38.09	123.48		15	23	42.1	359.8
16	1	28	23.55	115.45		9	37	52.0	506.7	16	3	03	41.57	123.69		15	29	41.9	355.8
17	1	30	19.00	115.57		9	46	18.7	504.5	17	3	05	45.26	123.90		15	35	37.7	351.8
18	1	32	14.57	115.69		9	54	43.2	502.1	18	3	07	49.16	124.12		15	41	29.5	347.7
19	1	34	10.26	115.82		10	03	05.3	499.7	19	3	09	53.28	124.32		15	47	17.2	343.5
20	1	36	06.08	115.95		10	11	25.0	497.2	20	3	11	57.60	124.53		15	53	00.7	339.4
21	1	38	02.03	116.09		10	19	42.2	494.9	21	3	14	02.13	124.75		15	58	40.1	335.1
22	1	39	58.12	116.21		10	27	57.1	492.3	22	3	16	06.88	124.96		16	04	15.2	331.0
23	1	41	54.33	116.36		10	36	09.4	+489.8	23	3	18	11.84	125.18		16	09	46.2	+326.6
24	1	43	50.69		+10	44	19.2			24	3	20	17.02		+16	15	12.8		

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JULY 12									JULY 14								
	h	m	s		°	'	"			h	m	s		°	'	"	
0	3	20	17.02		+16	15	12.8		0	5	04	35.74		+18	59	58.1	
1	3	22	22.41	125.39				+322.3	1	5	06	51.01	135.27				+70.5
2	3	24	28.01	125.60				317.9	2	5	09	06.44	135.43				64.5
3	3	26	33.83	125.82				313.5	3	5	11	22.05	135.61				58.4
4	3	28	39.87	126.04				309.1	4	5	13	37.83	135.78				52.3
5	3	30	46.13	126.26				304.6	5	5	15	53.77	135.94				46.1
6	3	32	52.60	126.47				300.1	6	5	18	09.88	136.11				39.9
7	3	34	59.29	126.69				295.5	7	5	20	26.14	136.26				33.8
8	3	37	06.20	126.91				290.9	8	5	22	42.57	136.43				27.6
9	3	39	13.32	127.12				286.3	9	5	24	59.15	136.58				21.3
10	3	41	20.66	127.34				281.6	10	5	27	15.88	136.73				15.1
11	3	43	28.22	127.56				276.8	11	5	29	32.76	136.88				8.8
12	3	45	36.00	127.78				272.1	12	5	31	49.80	137.04				+2.4
13	3	47	43.99	127.99				267.4	13	5	34	06.97	137.17				-3.8
14	3	49	52.20	128.21				262.5	14	5	36	24.29	137.32				10.2
15	3	52	00.63	128.43				257.6	15	5	38	41.75	137.46				16.6
16	3	54	09.28	128.65				252.7	16	5	40	59.35	137.60				22.9
17	3	56	18.14	128.86				247.7	17	5	43	17.08	137.73				29.4
18	3	58	27.22	129.08				242.8	18	5	45	34.94	137.86				35.7
19	4	00	36.51	129.29				237.7	19	5	47	52.93	137.99				42.2
20	4	02	46.02	129.51				232.7	20	5	50	11.04	138.11				48.6
21	4	04	55.75	129.73				227.6	21	5	52	29.28	138.24				55.1
22	4	07	05.68	129.93				222.5	22	5	54	47.64	138.36				61.6
23	4	09	15.84	130.16				217.2	23	5	57	06.11	138.47				68.0
				130.36				+212.1					138.58				-74.6
JULY 13									JULY 15								
0	4	11	26.20		+18	02	44.0		0	5	59	24.69		+18	59	30.1	
1	4	13	36.78	130.58				+206.8	1	6	01	43.39	138.70				-81.0
2	4	15	47.56	130.78				201.5	2	6	04	02.19	138.80				87.6
3	4	17	58.56	131.00				196.2	3	6	06	21.09	138.90				94.1
4	4	20	09.77	131.21				190.9	4	6	08	40.09	139.00				100.6
5	4	22	21.18	131.41				185.4	5	6	10	59.20	139.11				107.2
6	4	24	32.80	131.62				180.1	6	6	13	18.39	139.19				113.8
7	4	26	44.63	131.83				174.5	7	6	15	37.68	139.29				120.3
8	4	28	56.66	132.03				169.1	8	6	17	57.05	139.37				126.8
9	4	31	08.89	132.23				163.5	9	6	20	16.51	139.46				133.4
10	4	33	21.33	132.44				157.9	10	6	22	36.05	139.54				140.0
11	4	35	33.96	132.63				152.4	11	6	24	55.67	139.62				146.6
12	4	37	46.80	132.84				146.7	12	6	27	15.36	139.69				153.1
13	4	39	59.83	133.03				141.0	13	6	29	35.13	139.77				159.7
14	4	42	13.06	133.23				135.4	14	6	31	54.96	139.83				166.3
15	4	44	26.48	133.42				129.6	15	6	34	14.86	139.90				172.9
16	4	46	40.10	133.62				123.8	16	6	36	34.82	139.96				179.4
17	4	48	53.91	133.81				118.0	17	6	38	54.84	140.02				186.0
18	4	51	07.90	133.99				112.2	18	6	41	14.91	140.07				192.5
19	4	53	22.09	134.19				106.4	19	6	43	35.04	140.13				199.1
20	4	55	36.46	134.37				100.4	20	6	45	55.21	140.17				205.7
21	4	57	51.01	134.55				94.5	21	6	48	15.43	140.22				212.2
22	5	00	05.74	134.73				88.6	22	6	50	35.69	140.26				218.7
23	5	02	20.65	134.91				82.6	23	6	52	55.99	140.30				225.3
24	5	04	35.74	135.09				+76.6	24	6	55	16.33	140.34				-231.7
															</		

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
JULY 16									JULY 18										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	6	55	16.33		+17	56	56.1	-238.3	0	8	47	20.73		+12	51	14.5	-518.4		
1	6	57	36.70	140.37		17	52	57.8	244.7	1	8	49	39.67	138.94		12	42	36.1	523.3
2	6	59	57.10	140.40		17	48	53.1	251.3	2	8	51	58.54	138.87		12	33	52.8	528.0
3	7	02	17.53	140.43		17	44	41.8	257.7	3	8	54	17.34	138.80		12	25	04.8	532.8
4	7	04	37.98	140.45		17	40	24.1	264.1	4	8	56	36.06	138.72		12	16	12.0	537.3
5	7	06	58.45	140.47		17	36	00.0	269.6	5	8	58	54.71	138.65		12	07	14.7	542.0
6	7	09	18.94	140.49		17	31	29.4	270.6	6	9	01	13.29	138.58		11	58	12.7	546.5
7	7	11	39.45	140.51		17	26	52.4	277.0	7	9	03	31.79	138.50		11	49	06.2	551.0
8	7	13	59.96	140.51		17	22	09.0	283.4	8	9	05	50.21	138.42		11	39	55.2	555.4
9	7	16	20.48	140.52		17	17	19.3	289.7	9	9	08	08.56	138.35		11	30	39.8	559.7
10	7	18	41.01	140.53		17	12	23.2	296.1	10	9	10	26.83	138.27		11	21	20.1	564.1
11	7	21	01.55	140.54		17	07	20.7	302.5	11	9	12	45.02	138.19		11	11	56.0	568.3
12	7	23	22.08	140.53		17	02	12.0	308.7	12	9	15	03.14	138.12		11	02	27.7	572.5
13	7	25	42.61	140.53		16	56	56.9	315.1	13	9	17	21.18	138.04		10	52	55.2	576.6
14	7	28	03.13	140.52		16	51	35.6	321.3	14	9	19	39.14	137.96		10	43	18.6	580.7
15	7	30	23.65	140.52		16	46	08.0	327.6	15	9	21	57.02	137.88		10	33	37.9	584.6
16	7	32	44.15	140.50		16	40	34.2	333.8	16	9	24	14.83	137.81		10	23	53.3	588.6
17	7	35	04.64	140.49		16	34	54.3	339.9	17	9	26	32.56	137.73		10	14	04.7	592.5
18	7	37	25.11	140.47		16	29	08.1	346.2	18	9	28	50.21	137.65		10	04	12.2	596.2
19	7	39	45.57	140.46		16	23	15.9	352.2	19	9	31	07.78	137.57		9	54	16.0	600.1
20	7	42	06.00	140.43		16	17	17.5	358.4	20	9	33	25.28	137.50		9	44	15.9	603.6
21	7	44	26.41	140.41		16	11	13.1	364.4	21	9	35	42.70	137.42		9	34	12.3	607.3
22	7	46	46.79	140.38		16	05	02.6	370.5	22	9	38	00.05	137.35		9	24	05.0	610.9
23	7	49	07.15	140.36		+15	58	46.1	376.5	23	9	40	17.32	137.27		+ 9	13	54.1	-614.3
				140.32					-382.4					137.19					
JULY 17									JULY 19										
0	7	51	27.47		+15	52	23.7	-388.4	0	9	42	34.51		+ 9	03	39.8	-617.8		
1	7	53	47.76	140.29		15	45	55.3	394.3	1	9	44	51.64	137.13		8	53	22.0	621.1
2	7	56	08.01	140.25		15	39	21.0	399.4	2	9	47	08.68	137.04		8	43	00.9	624.4
3	7	58	28.23	140.22		15	32	40.8	400.2	3	9	49	25.66	136.98		8	32	36.5	627.6
4	8	00	48.40	140.17		15	25	54.8	406.0	4	9	51	42.56	136.90		8	22	08.9	630.8
5	8	03	08.54	140.14		15	19	03.0	411.8	5	9	53	59.39	136.83		8	11	38.1	633.9
6	8	05	28.63	140.09		15	12	05.5	417.5	6	9	56	16.14	136.75		8	01	04.2	636.8
7	8	07	48.67	140.04		15	05	02.2	423.3	7	9	58	32.83	136.69		7	50	27.4	639.9
8	8	10	08.67	140.00		14	57	53.3	428.9	8	10	00	49.45	136.62		7	39	47.5	642.7
9	8	12	28.61	139.94		14	50	38.7	434.6	9	10	03	06.00	136.55		7	29	04.8	645.5
10	8	14	48.51	139.90		14	43	18.5	440.2	10	10	05	22.49	136.49		7	18	19.3	648.3
11	8	17	08.35	139.84		14	35	52.8	445.7	11	10	07	38.90	136.41		7	07	31.0	650.9
12	8	19	28.13	139.78		14	28	21.6	451.2	12	10	09	55.26	136.36		6	56	40.1	653.5
13	8	21	47.86	139.73		14	20	44.9	456.7	13	10	12	11.54	136.28		6	45	46.6	656.1
14	8	24	07.53	139.67		14	13	02.8	462.1	14	10	14	27.77	136.23		6	34	50.5	658.6
15	8	26	27.14	139.61		14	05	15.3	467.5	15	10	16	43.93	136.16		6	23	51.9	661.0
16	8	28	46.69	139.55		13	57	22.5	472.8	16	10	19	00.04	136.11		6	12	50.9	663.2
17	8	31	06.18	139.49		13	49	24.5	478.0	17	10	21	16.08	136.04		6	01	47.7	665.6
18	8	33	25.60	139.42		13	41	21.2	483.3	18	10	23	32.07	135.99		5	50	42.1	667.7
19	8	35	44.96	139.36		13	33	12.7	488.5	19	10	25	48.00	135.93		5	39	34.4	669.9
20	8	38	04.25	139.29		13	24	59.1	493.6	20	10	28	03.88	135.88		5	28	24.5	671.9
21	8	40	23.47	139.22		13	16	40.5	498.6	21	10	30	19.70	135.82		5	17	12.6	673.8
22	8	42	42.63	139.16		13	08	16.8	503.7	22	10	32	35.48	135.78		5	05	58.8	675.8
23	8	45	01.71	139.08		12	59	48.1	508.7	23	10	34	51.20	135.72		4	54	43.0	-677.6
24	8	47	20.73	139.02		+12	51	14.5	-513.6	24	10	37	06.87	135.67		+ 4	43	25.4	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
JULY 20									JULY 22									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	10	37	06.87	135.63	+4	43	25.4	-679.3	0	12	25	19.85	135.74	-	4	31	04.1	-679.3
1	10	39	22.50	135.58	4	32	06.1	681.1	1	12	27	35.59	135.78	4	42	23.4	677.5	
2	10	41	38.08	135.54	4	20	45.0	682.7	2	12	29	51.37	135.85	4	53	40.9	675.8	
3	10	43	53.62	135.49	4	09	22.3	684.2	3	12	32	07.22	135.90	5	04	56.7	673.8	
4	10	46	09.11	135.46	3	57	58.1	685.7	4	12	34	23.12	135.97	5	16	10.5	671.9	
5	10	48	24.57	135.42	3	46	32.4	687.0	5	12	36	39.09	136.02	5	27	22.4	669.9	
6	10	50	39.99	135.38	3	35	05.4	688.5	6	12	38	55.11	136.10	5	38	32.3	667.8	
7	10	52	55.37	135.34	3	23	36.9	689.6	7	12	41	11.21	136.16	5	49	40.1	665.6	
8	10	55	10.71	135.32	3	12	07.3	690.9	8	12	43	27.37	136.23	6	00	45.7	663.4	
9	10	57	26.03	135.28	3	00	36.4	692.0	9	12	45	43.60	136.30	6	11	49.1	661.1	
10	10	59	41.31	135.25	2	49	04.4	693.0	10	12	47	59.90	136.37	6	22	50.2	658.8	
11	11	01	56.56	135.23	2	37	31.4	694.0	11	12	50	16.27	136.45	6	33	49.0	656.3	
12	11	04	11.79	135.20	2	25	57.4	694.9	12	12	52	32.72	136.53	6	44	45.3	653.8	
13	11	06	26.99	135.18	2	14	22.5	695.7	13	12	54	49.25	136.60	6	55	39.1	651.2	
14	11	08	42.17	135.16	2	02	46.8	696.4	14	12	57	05.85	136.69	7	06	30.3	648.6	
15	11	10	57.33	135.14	1	51	10.4	697.2	15	12	59	22.54	136.76	7	17	18.9	645.9	
16	11	13	12.47	135.12	1	39	33.2	697.7	16	13	01	39.30	136.85	7	28	04.8	643.1	
17	11	15	27.59	135.11	1	27	55.5	698.3	17	13	03	56.15	136.94	7	38	47.9	640.3	
18	11	17	42.70	135.10	1	16	17.2	698.8	18	13	06	13.09	137.02	7	49	28.2	637.4	
19	11	19	57.80	135.08	1	04	38.4	699.1	19	13	08	30.11	137.11	8	00	05.6	634.4	
20	11	22	12.88	135.08	0	52	59.3	699.5	20	13	10	47.22	137.21	8	10	40.0	631.4	
21	11	24	27.96	135.07	0	41	19.8	699.7	21	13	13	04.43	137.29	8	21	11.4	628.3	
22	11	26	43.03	135.07	0	29	40.1	699.9	22	13	15	21.72	137.39	8	31	39.7	625.1	
23	11	28	58.10	135.06	+0	18	00.2	-700.0	23	13	17	39.11	137.48	-	8	42	04.8	-621.9
JULY 21									JULY 23									
0	11	31	13.16	135.06	+0	06	20.2	-700.0	0	13	19	56.59	137.58	-	8	52	26.7	-618.6
1	11	33	28.22	135.07	-0	05	19.8	700.0	1	13	22	14.17	137.68	9	02	45.3	615.2	
2	11	35	43.29	135.07	0	16	59.8	699.9	2	13	24	31.85	137.78	9	13	00.5	611.8	
3	11	37	58.36	135.08	0	28	39.7	699.7	3	13	26	49.63	137.87	9	23	12.3	608.3	
4	11	40	13.44	135.09	0	40	19.4	699.4	4	13	29	07.50	137.98	9	33	20.6	604.8	
5	11	42	28.53	135.10	0	51	58.8	699.1	5	13	31	25.48	138.08	9	43	25.4	601.1	
6	11	44	43.63	135.11	1	03	37.9	698.7	6	13	33	43.56	138.19	9	53	26.5	597.5	
7	11	46	58.74	135.13	1	15	16.6	698.3	7	13	36	01.75	138.29	10	03	24.0	593.7	
8	11	49	13.87	135.14	1	26	54.9	697.6	8	13	38	20.04	138.39	10	13	17.7	589.9	
9	11	51	29.01	135.17	1	38	32.5	697.1	9	13	40	38.43	138.51	10	23	07.6	586.1	
10	11	53	44.18	135.19	1	50	09.6	696.4	10	13	42	56.94	138.61	10	32	53.7	582.1	
11	11	55	59.37	135.21	2	01	46.0	695.6	11	13	45	15.55	138.72	10	42	35.8	578.1	
12	11	58	14.58	135.24	2	13	21.6	694.8	12	13	47	34.27	138.83	10	52	13.9	574.1	
13	12	00	29.82	135.27	2	24	56.4	693.9	13	13	49	53.10	138.94	11	01	48.0	569.9	
14	12	02	45.09	135.30	2	36	30.3	692.9	14	13	52	12.04	139.06	11	11	17.9	565.8	
15	12	05	00.39	135.33	2	48	03.2	691.9	15	13	54	31.10	139.16	11	20	43.7	561.6	
16	12	07	15.72	135.37	2	59	35.1	690.8	16	13	56	50.26	139.28	11	30	05.3	557.2	
17	12	09	31.09	135.41	3	11	05.9	689.6	17	13	59	09.54	139.39	11	39	22.5	552.9	
18	12	11	46.50	135.44	3	22	35.5	688.3	18	14	01	28.93	139.51	11	48	35.4	548.5	
19	12	14	01.94	135.49	3	34	03.8	687.0	19	14	03	48.44	139.62	11	57	43.9	544.0	
20	12	16	17.43	135.54	3	45	30.8	685.6	20	14	06	08.06	139.73	12	06	47.9	539.5	
21	12	18	32.97	135.58	3	56	56.4	684.1	21	14	08	27.79	139.85	12	15	47.4	534.9	
22	12	20	48.55	135.62	4	08	20.5	682.6	22	14	10	47.64	139.97	12	24	42.3	530.2	
23	12	23	04.17	135.68	4	19	43.1	-681.0	23	14	13	07.61	140.08	12	33	32.5	-525.6	
24	12	25	19.85		-4	31	04.1		24	14	15	27.69		-	12	42	18.1	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JULY 24									JULY 26								
0	h	m	s	s	°	'	"	"	0	h	m	s	s	°	'	"	"
0	14	15	27.69		-12	42	18.1	-520.8	0	16	09	35.26		-17	54	07.4	-236.8
1	14	17	47.89	140.20	12	50	58.9	515.9	1	16	11	59.88	144.62	17	58	04.2	230.0
2	14	20	08.20	140.31	12	59	34.8	511.1	2	16	14	24.54	144.66	18	01	54.2	223.2
3	14	22	28.63	140.43	13	08	05.9	506.2	3	16	16	49.24	144.70	18	05	37.4	216.3
4	14	24	49.17	140.54	13	16	32.1	501.2	4	16	19	13.98	144.74	18	09	13.7	209.5
5	14	27	09.83	140.66	13	24	53.3	496.1	5	16	21	38.74	144.76	18	12	43.2	202.7
6	14	29	30.61	140.78	13	33	09.4	491.1	6	16	24	03.54	144.80	18	16	05.9	195.7
7	14	31	51.50	140.89	13	41	20.5	485.9	7	16	26	28.36	144.82	18	19	21.6	188.9
8	14	34	12.51	141.01	13	49	26.4	480.8	8	16	28	53.20	144.84	18	22	30.5	181.9
9	14	36	33.63	141.12	13	57	27.2	475.4	9	16	31	18.06	144.86	18	25	32.4	175.0
10	14	38	54.87	141.24	14	05	22.6	470.2	10	16	33	42.94	144.88	18	28	27.4	168.1
11	14	41	16.22	141.35	14	13	12.8	464.8	11	16	36	07.82	144.88	18	31	15.5	161.1
12	14	43	37.68	141.46	14	20	57.6	459.5	12	16	38	32.72	144.90	18	33	56.6	154.1
13	14	45	59.25	141.57	14	28	37.1	453.9	13	16	40	57.62	144.90	18	36	30.7	147.2
14	14	48	20.94	141.69	14	36	11.0	448.5	14	16	43	22.52	144.90	18	38	57.9	140.1
15	14	50	42.74	141.80	14	43	39.5	442.9	15	16	45	47.42	144.90	18	41	18.0	133.1
16	14	53	04.65	141.91	14	51	02.4	437.4	16	16	48	12.31	144.89	18	43	31.1	126.2
17	14	55	26.67	142.02	14	58	19.8	431.6	17	16	50	37.19	144.88	18	45	37.3	119.1
18	14	57	48.80	142.13	15	05	31.4	426.0	18	16	53	02.06	144.87	18	47	36.4	112.1
19	15	00	11.03	142.23	15	12	37.4	420.3	19	16	55	26.91	144.85	18	49	28.5	105.1
20	15	02	33.37	142.34	15	19	37.7	414.4	20	16	57	51.74	144.83	18	51	13.6	98.0
21	15	04	55.81	142.44	15	26	32.1	408.7	21	17	00	16.54	144.80	18	52	51.6	91.0
22	15	07	18.36	142.55	15	33	20.8	402.7	22	17	02	41.32	144.78	18	54	22.6	84.0
23	15	09	41.01	142.65	-15	40	03.5	-396.9	23	17	05	06.07	144.75	-18	55	46.6	-76.9
			142.76									144.70					
JULY 25									JULY 27								
0	15	12	03.77	142.85	-15	46	40.4	-390.8	0	17	07	30.77	144.67	-18	57	03.5	-70.0
1	15	14	26.62	142.95	15	53	11.2	384.9	1	17	09	55.44	144.63	18	58	13.5	62.8
2	15	16	49.57	143.04	15	59	36.1	378.8	2	17	12	20.07	144.58	18	59	16.3	55.9
3	15	19	12.61	143.15	16	05	54.9	372.8	3	17	14	44.65	144.52	19	00	12.2	48.8
4	15	21	35.76	143.23	16	12	07.7	366.6	4	17	17	09.17	144.47	19	01	01.0	41.7
5	15	23	58.99	143.33	16	18	14.3	360.4	5	17	19	33.64	144.42	19	01	42.7	34.8
6	15	26	22.32	143.41	16	24	14.7	354.2	6	17	21	58.06	144.35	19	02	17.5	27.8
7	15	28	45.73	143.50	16	30	08.9	348.0	7	17	24	22.41	144.28	19	02	45.3	20.7
8	15	31	09.23	143.59	16	35	56.9	341.7	8	17	26	46.69	144.21	19	03	06.0	13.8
9	15	33	32.82	143.67	16	41	38.6	335.4	9	17	29	10.90	144.14	19	03	19.8	-6.8
10	15	35	56.49	143.75	16	47	14.0	329.0	10	17	31	35.04	144.06	19	03	26.6	+0.2
11	15	38	20.24	143.83	16	52	43.0	322.7	11	17	33	59.10	143.98	19	03	26.4	7.1
12	15	40	44.07	143.90	16	58	05.7	316.2	12	17	36	23.08	143.89	19	03	19.3	14.1
13	15	43	07.97	143.98	17	03	21.9	309.7	13	17	38	46.97	143.81	19	03	05.2	21.0
14	15	45	31.95	144.05	17	08	31.6	303.3	14	17	41	10.78	143.71	19	02	44.2	28.0
15	15	47	56.00	144.12	17	13	34.9	296.7	15	17	43	34.49	143.61	19	02	16.2	34.8
16	15	50	20.12	144.19	17	18	31.6	290.2	16	17	45	58.10	143.51	19	01	41.4	41.8
17	15	52	44.31	144.25	17	23	21.8	283.6	17	17	48	21.61	143.41	19	00	59.6	48.6
18	15	55	08.56	144.31	17	28	05.4	277.1	18	17	50	45.02	143.20	19	00	11.0	55.4
19	15	57	32.87	144.38	17	32	42.5	270.3	19	17	53	08.32	143.19	18	59	15.6	62.3
20	15	59	57.25	144.42	17	37	12.8	263.7	20	17	55	31.51	143.07	18	58	13.3	69.1
21	16	02	21.67	144.48	17	41	36.5	257.0	21	17	57	54.58	142.95	18	57	04.2	75.8
22	16	04	46.15	144.53	17	45	53.5	250.3	22	18	00	17.53	142.83	18	55	48.4	82.7
23	16	07	10.68	144.58	17	50	03.8	-243.6	23	18	02	40.36	142.71	18	54	25.7	+89.4
24	16	09	35.26		-17	54	07.4		24	18	05	03.07		-18	52	56.3	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
JULY 28									JULY 30								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	18	05	03.07	142.57	-18	52	56.3	+96.1	0	19	55	46.51	133.19	-15	40	13.7	+375.3
1	18	07	25.64	142.45	18	51	20.2	102.8	1	19	57	59.70	132.95	15	33	58.4	380.0
2	18	09	48.09	142.30	18	49	37.4	109.5	2	20	00	12.65	132.72	15	27	38.4	384.6
3	18	12	10.39	142.17	18	47	47.9	116.1	3	20	02	25.37	132.48	15	21	13.8	389.1
4	18	14	32.56	142.02	18	45	51.8	122.7	4	20	04	37.85	132.24	15	14	44.7	393.7
5	18	16	54.58	141.87	18	43	49.1	129.3	5	20	06	50.09	132.00	15	08	11.0	398.2
6	18	19	16.45	141.73	18	41	39.8	135.9	6	20	09	02.09	131.76	15	01	32.8	402.6
7	18	21	38.18	141.57	18	39	23.9	142.4	7	20	11	13.85	131.53	14	54	50.2	406.9
8	18	23	59.75	141.42	18	37	01.5	148.8	8	20	13	25.38	131.28	14	48	03.3	411.3
9	18	26	21.17	141.26	18	34	32.7	155.4	9	20	15	36.66	131.04	14	41	12.0	415.5
10	18	28	42.43	141.09	18	31	57.3	161.7	10	20	17	47.70	130.81	14	34	16.5	419.7
11	18	31	03.52	140.93	18	29	15.6	168.2	11	20	19	58.51	130.56	14	27	16.8	423.8
12	18	33	24.45	140.76	18	26	27.4	174.5	12	20	22	09.07	130.32	14	20	13.0	427.9
13	18	35	45.21	140.58	18	23	32.9	180.8	13	20	24	19.39	130.09	14	13	05.1	432.0
14	18	38	05.79	140.42	18	20	32.1	187.2	14	20	26	29.48	129.84	14	05	53.1	436.0
15	18	40	26.21	140.23	18	17	24.9	193.4	15	20	28	39.32	129.61	13	58	37.1	439.9
16	18	42	46.44	140.06	18	14	11.5	199.6	16	20	30	48.93	129.36	13	51	17.2	443.7
17	18	45	06.50	139.87	18	10	51.9	205.7	17	20	32	58.29	129.13	13	43	53.5	447.6
18	18	47	26.37	139.69	18	07	26.2	211.9	18	20	35	07.42	128.89	13	36	25.9	451.4
19	18	49	46.06	139.50	18	03	54.3	218.1	19	20	37	16.31	128.65	13	28	54.5	455.0
20	18	52	05.56	139.31	18	00	16.2	224.0	20	20	39	24.96	128.41	13	21	19.5	458.8
21	18	54	24.87	139.11	17	56	32.2	230.1	21	20	41	33.37	128.18	13	13	40.7	462.3
22	18	56	43.98	138.92	17	52	42.1	236.1	22	20	43	41.55	127.94	13	05	58.4	465.9
23	18	59	02.90	138.72	-17	48	46.0	+242.0	23	20	45	49.49	127.70	-12	58	12.5	+469.4
JULY 29									JULY 31								
0	19	01	21.62	138.53	-17	44	44.0	+247.9	0	20	47	57.19	127.47	-12	50	23.1	+472.8
1	19	03	40.15	138.31	17	40	36.1	253.7	1	20	50	04.66	127.24	12	42	30.3	476.2
2	19	05	58.46	138.12	17	36	22.4	259.5	2	20	52	11.90	127.00	12	34	34.1	479.6
3	19	08	16.58	137.90	17	32	02.9	265.4	3	20	54	18.90	126.76	12	26	34.5	482.8
4	19	10	34.48	137.70	17	27	37.5	271.0	4	20	56	25.66	126.54	12	18	31.7	486.1
5	19	12	52.18	137.49	17	23	06.5	276.7	5	20	58	32.20	126.31	12	10	25.6	489.2
6	19	15	09.67	137.27	17	18	29.8	282.3	6	21	00	38.51	126.07	12	02	16.4	492.4
7	19	17	26.94	137.06	17	13	47.5	287.9	7	21	02	44.58	125.85	11	54	04.0	495.4
8	19	19	44.00	136.85	17	08	59.6	293.5	8	21	04	50.43	125.62	11	45	48.6	498.4
9	19	22	00.85	136.62	17	04	06.1	298.9	9	21	06	56.05	125.39	11	37	30.2	501.4
10	19	24	17.47	136.41	16	59	07.2	304.3	10	21	09	01.44	125.17	11	29	08.8	504.3
11	19	26	33.88	136.18	16	54	02.9	309.8	11	21	11	06.61	124.94	11	20	44.5	507.2
12	19	28	50.06	135.96	16	48	53.1	315.1	12	21	13	11.55	124.72	11	12	17.3	510.0
13	19	31	06.02	135.74	16	43	38.0	320.4	13	21	15	16.27	124.50	11	03	47.3	512.7
14	19	33	21.76	135.51	16	38	17.6	325.6	14	21	17	20.77	124.28	10	55	14.6	515.4
15	19	35	37.27	135.28	16	32	52.0	330.8	15	21	19	25.05	124.06	10	46	39.2	518.1
16	19	37	52.55	135.06	16	27	21.2	336.0	16	21	21	29.11	123.84	10	38	01.1	520.6
17	19	40	07.61	134.82	16	21	45.2	341.1	17	21	23	32.95	123.63	10	29	20.5	523.3
18	19	42	22.43	134.60	16	16	04.1	346.1	18	21	25	36.58	123.41	10	20	37.2	525.6
19	19	44	37.03	134.36	16	10	18.0	351.1	19	21	27	39.99	123.20	10	11	51.6	528.2
20	19	46	51.39	134.13	16	04	26.9	356.0	20	21	29	43.19	122.99	10	03	03.4	530.5
21	19	49	05.52	133.90	15	58	30.9	360.9	21	21	31	46.18	122.78	9	54	12.9	532.9
22	19	51	19.42	133.66	15	52	30.0	365.8	22	21	33	48.96	122.57	9	45	20.0	535.1
23	19	53	33.08	133.43	15	46	24.2	+370.5	23	21	35	51.53	122.37	9	36	24.9	+537.4
24	19	55	46.51		-15	40	13.7		24	21	37	53.90		- 9	27	27.5	

MOON, 1958

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Hour	Right Ascension			Declination	Hour	Right Ascension			Declination
AUGUST 1					AUGUST 3				
	h	m	s	° ' " "		h	m	s	° ' " "
0	21	37	53.90	122.16	0	23	12	24.89	114.87
1	21	39	56.06	121.95	1	23	14	19.76	114.78
2	21	41	58.01	121.76	2	23	16	14.54	114.69
3	21	43	59.77	121.56	3	23	18	09.23	114.60
4	21	46	01.33	121.36	4	23	20	03.83	114.52
5	21	48	02.69	121.16	5	23	21	58.35	114.44
6	21	50	03.85	120.97	6	23	23	52.79	114.36
7	21	52	04.82	120.78	7	23	25	47.15	114.28
8	21	54	05.60	120.59	8	23	27	41.43	114.21
9	21	56	06.19	120.40	9	23	29	35.64	114.14
10	21	58	06.59	120.22	10	23	31	29.78	114.08
11	22	00	06.81	120.03	11	23	33	23.86	114.00
12	22	02	06.84	119.86	12	23	35	17.86	113.95
13	22	04	06.70	119.67	13	23	37	11.81	113.88
14	22	06	06.37	119.49	14	23	39	05.69	113.83
15	22	08	05.86	119.32	15	23	40	59.52	113.78
16	22	10	05.18	119.15	16	23	42	53.30	113.72
17	22	12	04.33	118.98	17	23	44	47.02	113.67
18	22	14	03.31	118.81	18	23	46	40.69	113.63
19	22	16	02.12	118.64	19	23	48	34.32	113.58
20	22	18	00.76	118.48	20	23	50	27.90	113.54
21	22	19	59.24	118.31	21	23	52	21.44	113.51
22	22	21	57.55	118.16	22	23	54	14.95	113.47
23	22	23	55.71	118.00	23	23	56	08.42	113.43
AUGUST 2					AUGUST 4				
	h	m	s	° ' " "		h	m	s	° ' " "
0	22	25	53.71	117.84	0	23	58	01.85	113.41
1	22	27	51.55	117.70	1	23	59	55.26	113.38
2	22	29	49.25	117.54	2	0	01	48.64	113.36
3	22	31	46.79	117.39	3	0	03	42.00	113.33
4	22	33	44.18	117.25	4	0	05	35.33	113.31
5	22	35	41.43	117.11	5	0	07	28.64	113.30
6	22	37	38.54	116.97	6	0	09	21.94	113.28
7	22	39	35.51	116.82	7	0	11	15.22	113.28
8	22	41	32.33	116.70	8	0	13	08.50	113.26
9	22	43	29.03	116.56	9	0	15	01.76	113.26
10	22	45	25.59	116.43	10	0	16	55.02	113.26
11	22	47	22.02	116.30	11	0	18	48.28	113.25
12	22	49	18.32	116.17	12	0	20	41.53	113.26
13	22	51	14.49	116.06	13	0	22	34.79	113.26
14	22	53	10.55	115.93	14	0	24	28.05	113.28
15	22	55	06.48	115.82	15	0	26	21.33	113.28
16	22	57	02.30	115.70	16	0	28	14.61	113.29
17	22	58	58.00	115.58	17	0	30	07.90	113.31
18	23	00	53.58	115.48	18	0	32	01.21	113.33
19	23	02	49.06	115.37	19	0	33	54.54	113.36
20	23	04	44.43	115.27	20	0	35	47.90	113.37
21	23	06	39.70	115.16	21	0	37	41.27	113.40
22	23	08	34.86	115.06	22	0	39	34.67	113.43
23	23	10	29.92	114.97	23	0	41	28.10	113.47
24	23	12	24.89		24	0	43	21.57	

MOON, 1958
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Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
AUGUST 5						AUGUST 7					
	h	m	s	s	° ' " "		h	m	s	s	° ' " "
0	0	43	21.57	113.49	+ 5 52 45.6 +551.2	0	2	15	34.78	118.06	+12 34 27.6 +438.5
1	0	45	15.06	113.54	6 01 56.8 549.7	1	2	17	32.84	118.20	12 41 46.1 435.4
2	0	47	08.60	113.57	6 11 06.5 548.1	2	2	19	31.04	118.36	12 49 01.5 432.2
3	0	49	02.17	113.62	6 20 14.6 546.3	3	2	21	29.40	118.52	12 56 13.7 429.0
4	0	50	55.79	113.66	6 29 20.9 544.7	4	2	23	27.92	118.66	13 03 22.7 425.8
5	0	52	49.45	113.71	6 38 25.6 542.9	5	2	25	26.58	118.83	13 10 28.5 422.5
6	0	54	43.16	113.75	6 47 28.5 541.1	6	2	27	25.41	118.98	13 17 31.0 419.3
7	0	56	36.91	113.82	6 56 29.6 539.4	7	2	29	24.39	119.15	13 24 30.3 415.9
8	0	58	30.73	113.86	7 05 29.0 537.5	8	2	31	23.54	119.30	13 31 26.2 412.5
9	1	00	24.59	113.93	7 14 26.5 535.7	9	2	33	22.84	119.48	13 38 18.7 409.2
10	1	02	18.52	113.98	7 23 22.2 533.7	10	2	35	22.32	119.63	13 45 07.9 405.7
11	1	04	12.50	114.05	7 32 15.9 531.9	11	2	37	21.95	119.81	13 51 53.6 402.2
12	1	06	06.55	114.11	7 41 07.8 529.8	12	2	39	21.76	119.97	13 58 35.8 398.8
13	1	08	00.66	114.19	7 49 57.6 527.9	13	2	41	21.73	120.15	14 05 14.6 395.2
14	1	09	54.85	114.25	7 58 45.5 525.9	14	2	43	21.88	120.32	14 11 49.8 391.7
15	1	11	49.10	114.32	8 07 31.4 523.8	15	2	45	22.20	120.49	14 18 21.5 388.0
16	1	13	43.42	114.40	8 16 15.2 521.7	16	2	47	22.69	120.67	14 24 49.5 384.5
17	1	15	37.82	114.48	8 24 56.9 519.7	17	2	49	23.36	120.84	14 31 14.0 380.7
18	1	17	32.30	114.56	8 33 36.6 517.5	18	2	51	24.20	121.03	14 37 34.7 377.1
19	1	19	26.86	114.65	8 42 14.1 515.3	19	2	53	25.23	121.20	14 43 51.8 373.3
20	1	21	21.51	114.72	8 50 49.4 513.1	20	2	55	26.43	121.39	14 50 05.1 369.6
21	1	23	16.23	114.82	8 59 22.5 510.8	21	2	57	27.82	121.56	14 56 14.7 365.7
22	1	25	11.05	114.91	9 07 53.3 508.6	22	2	59	29.38	121.75	15 02 20.4 361.9
23	1	27	05.96	115.00	+ 9 16 21.9 +506.3	23	3	01	31.13	121.94	+15 08 22.3 +358.0
AUGUST 6						AUGUST 8					
0	1	29	00.96	115.09	+ 9 24 48.2 +504.0	0	3	03	33.07	122.13	+15 14 20.3 +354.2
1	1	30	56.05	115.19	9 33 12.2 501.6	1	3	05	35.20	122.31	15 20 14.5 350.2
2	1	32	51.24	115.29	9 41 33.8 499.2	2	3	07	37.51	122.50	15 26 04.7 346.2
3	1	34	46.53	115.40	9 49 53.0 496.8	3	3	09	40.01	122.69	15 31 50.9 342.2
4	1	36	41.93	115.50	9 58 09.8 494.3	4	3	11	42.70	122.88	15 37 33.1 338.1
5	1	38	37.43	115.60	10 06 24.1 491.9	5	3	13	45.58	123.08	15 43 11.2 334.1
6	1	40	33.03	115.72	10 14 36.0 489.3	6	3	15	48.66	123.27	15 48 45.3 329.9
7	1	42	28.75	115.82	10 22 45.3 486.8	7	3	17	51.93	123.46	15 54 15.2 325.8
8	1	44	24.57	115.94	10 30 52.1 484.1	8	3	19	55.39	123.66	15 59 41.0 321.6
9	1	46	20.51	116.06	10 38 56.2 481.6	9	3	21	59.05	123.85	16 05 02.6 317.4
10	1	48	16.57	116.18	10 46 57.8 478.9	10	3	24	02.90	124.05	16 10 20.0 313.1
11	1	50	12.75	116.29	10 54 56.7 476.3	11	3	26	06.95	124.25	16 15 33.1 308.8
12	1	52	09.04	116.42	11 02 53.0 473.5	12	3	28	11.20	124.45	16 20 41.9 304.5
13	1	54	05.46	116.54	11 10 46.5 470.9	13	3	30	15.65	124.65	16 25 46.4 300.2
14	1	56	02.00	116.67	11 18 37.4 468.0	14	3	32	20.30	124.84	16 30 46.6 295.7
15	1	57	58.67	116.80	11 26 25.4 465.2	15	3	34	25.14	125.05	16 35 42.3 291.3
16	1	59	55.47	116.93	11 34 10.6 462.4	16	3	36	30.19	125.25	16 40 33.6 286.8
17	2	01	52.40	117.07	11 41 53.0 459.5	17	3	38	35.44	125.46	16 45 20.4 282.4
18	2	03	49.47	117.20	11 49 32.5 456.6	18	3	40	40.90	125.65	16 50 02.8 277.8
19	2	05	46.67	117.34	11 57 09.1 453.7	19	3	42	46.55	125.86	16 54 40.6 273.2
20	2	07	44.01	117.48	12 04 42.8 450.7	20	3	44	52.41	126.06	16 59 13.8 268.6
21	2	09	41.49	117.62	12 12 13.5 447.8	21	3	46	58.47	126.27	17 03 42.4 263.9
22	2	11	39.11	117.76	12 19 41.3 444.6	22	3	49	04.74	126.47	17 08 06.3 259.3
23	2	13	36.87	117.91	12 27 05.9 +441.7	23	3	51	11.21	126.67	17 12 25.6 +254.6
24	2	15	34.78		+12 34 27.6	24	3	53	17.88		+17 16 40.2

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
AUGUST 9									AUGUST 11										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	3	53	17.88	126.88	+17	16	40.2	+249.8	0	5	38	32.76	136.07	+18	56	58.4	-16.2		
1	3	55	24.76	127.08		17	20	50.0	245.0	1	5	40	48.83	136.22		18	56	42.2	22.5
2	3	57	31.84	127.29		17	24	55.0	240.2	2	5	43	05.05	136.38		18	56	19.7	28.7
3	3	59	39.13	127.50		17	28	55.2	235.4	3	5	45	21.43	136.53		18	55	51.0	35.0
4	4	01	46.63	127.70		17	32	50.6	230.4	4	5	47	37.96	136.68		18	55	16.0	41.3
5	4	03	54.33	127.91		17	36	41.0	225.6	5	5	49	54.64	136.84		18	54	34.7	47.5
6	4	06	02.24	128.11		17	40	26.6	220.6	6	5	52	11.48	136.98		18	53	47.2	53.9
7	4	08	10.35	128.31		17	44	07.2	215.5	7	5	54	28.46	137.12		18	52	53.3	60.1
8	4	10	18.66	128.53		17	47	42.7	210.6	8	5	56	45.58	137.27		18	51	53.2	66.5
9	4	12	27.19	128.72		17	51	13.3	205.5	9	5	59	02.85	137.41		18	50	46.7	72.9
10	4	14	35.91	128.93		17	54	38.8	200.4	10	6	01	20.26	137.55		18	49	33.8	79.3
11	4	16	44.84	129.14		17	57	59.2	195.3	11	6	03	37.81	137.69		18	48	14.5	85.7
12	4	18	53.98	129.34		18	01	14.5	190.1	12	6	05	55.50	137.81		18	46	48.8	92.0
13	4	21	03.32	129.55		18	04	24.6	184.9	13	6	08	13.31	137.95		18	45	16.8	98.5
14	4	23	12.87	129.74		18	07	29.5	179.7	14	6	10	31.26	138.08		18	43	38.3	104.9
15	4	25	22.61	129.95		18	10	29.2	174.4	15	6	12	49.34	138.20		18	41	53.4	111.4
16	4	27	32.56	130.16		18	13	23.6	169.1	16	6	15	07.54	138.33		18	40	02.0	117.8
17	4	29	42.72	130.35		18	16	12.7	163.8	17	6	17	25.87	138.45		18	38	04.2	124.2
18	4	31	53.07	130.56		18	18	56.5	158.4	18	6	19	44.32	138.56		18	36	00.0	130.8
19	4	34	03.63	130.76		18	21	34.9	153.0	19	6	22	02.88	138.69		18	33	49.2	137.2
20	4	36	14.39	130.95		18	24	07.9	147.6	20	6	24	21.57	138.79		18	31	32.0	143.7
21	4	38	25.34	131.16		18	26	35.5	142.2	21	6	26	40.36	138.91		18	29	08.3	150.1
22	4	40	36.50	131.35		18	28	57.7	136.6	22	6	28	59.27	139.02		18	26	38.2	156.7
23	4	42	47.85	131.56	+18	31	14.3	+131.1		23	6	31	18.29	139.12	+18	24	01.5	-163.2	
AUGUST 10									AUGUST 12										
0	4	44	59.41	131.74	+18	33	25.4	+125.6	0	6	33	37.41	139.22	+18	21	18.3	-169.7		
1	4	47	11.15	131.95		18	35	31.0	119.9	1	6	35	56.63	139.33		18	18	28.6	176.3
2	4	49	23.10	132.14		18	37	30.9	114.4	2	6	38	15.96	139.42		18	15	32.3	182.7
3	4	51	35.24	132.33		18	39	25.3	108.7	3	6	40	35.38	139.52		18	12	29.6	189.3
4	4	53	47.57	132.52		18	41	14.0	103.0	4	6	42	54.90	139.61		18	09	20.3	195.7
5	4	56	00.09	132.72		18	42	57.0	97.4	5	6	45	14.51	139.70		18	06	04.6	202.3
6	4	58	12.81	132.91		18	44	34.4	91.6	6	6	47	34.21	139.79		18	02	42.3	208.8
7	5	00	25.72	133.09		18	46	06.0	85.8	7	6	49	54.00	139.87		17	59	13.5	215.3
8	5	02	38.81	133.28		18	47	31.8	80.0	8	6	52	13.87	139.95		17	55	38.2	221.8
9	5	04	52.09	133.47		18	48	51.8	74.2	9	6	54	33.82	140.04		17	51	56.4	228.4
10	5	07	05.56	133.65		18	50	06.0	68.4	10	6	56	53.86	140.11		17	48	08.0	234.8
11	5	09	19.21	133.84		18	51	14.4	62.4	11	6	59	13.97	140.18		17	44	13.2	241.4
12	5	11	33.05	134.01		18	52	16.8	56.6	12	7	01	34.15	140.25		17	40	11.8	247.8
13	5	13	47.06	134.20		18	53	13.4	50.6	13	7	03	54.40	140.33		17	36	04.0	254.3
14	5	16	01.26	134.37		18	54	04.0	44.7	14	7	06	14.73	140.39		17	31	49.7	260.8
15	5	18	15.63	134.56		18	54	48.7	38.7	15	7	08	35.12	140.45		17	27	28.9	267.3
16	5	20	30.19	134.73		18	55	27.4	32.6	16	7	10	55.57	140.51		17	23	01.6	273.7
17	5	22	44.92	134.90		18	56	00.0	26.7	17	7	13	16.08	140.57		17	18	27.9	280.1
18	5	24	59.82	135.07		18	56	26.7	20.5	18	7	15	36.65	140.63		17	13	47.8	286.6
19	5	27	14.89	135.24		18	56	47.2	14.5	19	7	17	57.28	140.68		17	09	01.2	293.0
20	5	29	30.13	135.41		18	57	01.7	8.4	20	7	20	17.96	140.73		17	04	08.2	299.4
21	5	31	45.54	135.58		18	57	10.1	+ 2.3	21	7	22	38.69	140.78		16	59	08.8	305.8
22	5	34	01.12	135.74		18	57	12.4	- 3.9	22	7	24	59.47	140.82		16	54	03.0	312.2
23	5	36	16.86	135.90		18	57	08.5	-10.1	23	7	27	20.29	140.87		16	48	50.8	-318.5
24	5	38	32.76		+18	56	58.4			24	7	29	41.16		+16	43	32.3		

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
AUGUST 13									AUGUST 15								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	7	29	41.16	140.90	+16	43	32.3	-324.9	0	9	22	31.28	140.56	+10	33	50.1	-588.6
1	7	32	02.06	140.94	16	38	07.4	331.2	1	9	24	51.84	140.53	10	24	01.5	592.8
2	7	34	23.00	140.98	16	32	36.2	337.5	2	9	27	12.37	140.49	10	14	08.7	597.0
3	7	36	43.98	141.01	16	26	58.7	343.7	3	9	29	32.86	140.45	10	04	11.7	601.2
4	7	39	04.99	141.05	16	21	15.0	350.1	4	9	31	53.31	140.41	9	54	10.5	605.2
5	7	41	26.04	141.07	16	15	24.9	356.2	5	9	34	13.72	140.38	9	44	05.3	609.3
6	7	43	47.11	141.09	16	09	28.7	362.5	6	9	36	34.10	140.34	9	33	56.0	613.2
7	7	46	08.20	141.12	16	03	26.2	368.6	7	9	38	54.44	140.30	9	23	42.8	617.0
8	7	48	29.32	141.14	15	57	17.6	374.8	8	9	41	14.74	140.26	9	13	25.8	620.9
9	7	50	50.46	141.16	15	51	02.8	380.9	9	9	43	35.00	140.23	9	03	04.9	624.6
10	7	53	11.62	141.17	15	44	41.9	387.1	10	9	45	55.23	140.18	8	52	40.3	628.3
11	7	55	32.79	141.19	15	38	14.8	393.1	11	9	48	15.41	140.15	8	42	12.0	631.8
12	7	57	53.98	141.21	15	31	41.7	399.2	12	9	50	35.56	140.11	8	31	40.2	635.4
13	8	00	15.19	141.21	15	25	02.5	405.1	13	9	52	55.67	140.07	8	21	04.8	638.9
14	8	02	36.40	141.22	15	18	17.4	411.2	14	9	55	15.74	140.03	8	10	25.9	642.2
15	8	04	57.62	141.23	15	11	26.2	417.1	15	9	57	35.77	139.99	7	59	43.7	645.6
16	8	07	18.85	141.23	15	04	29.1	423.0	16	9	59	55.76	139.96	7	48	58.1	648.8
17	8	09	40.08	141.23	14	57	26.1	428.9	17	10	02	15.72	139.92	7	38	09.3	651.9
18	8	12	01.31	141.23	14	50	17.2	434.8	18	10	04	35.64	139.88	7	27	17.4	655.1
19	8	14	22.54	141.23	14	43	02.4	440.5	19	10	06	55.52	139.84	7	16	22.3	658.0
20	8	16	43.77	141.23	14	35	41.9	446.3	20	10	09	15.36	139.81	7	05	24.3	661.0
21	8	19	05.00	141.22	14	28	15.6	452.0	21	10	11	35.17	139.78	6	54	23.3	663.9
22	8	21	26.22	141.22	14	20	43.6	457.8	22	10	13	54.95	139.74	6	43	19.4	666.7
23	8	23	47.44	141.21	+14	13	05.8	-463.3	23	10	16	14.69	139.70	+ 6	32	12.7	-669.3
AUGUST 14									AUGUST 16								
0	8	26	08.65	141.19	+14	05	22.5	-469.0	0	10	18	34.39	139.67	+ 6	21	03.4	-672.0
1	8	28	29.84	141.18	13	57	33.5	474.5	1	10	20	54.06	139.64	6	09	51.4	674.6
2	8	30	51.02	141.17	13	49	39.0	480.1	2	10	23	13.70	139.61	5	58	36.8	677.1
3	8	33	12.19	141.16	13	41	38.9	485.5	3	10	25	33.31	139.57	5	47	19.7	679.4
4	8	35	33.35	141.13	13	33	33.4	491.0	4	10	27	52.88	139.54	5	36	00.3	681.8
5	8	37	54.48	141.12	13	25	22.4	496.3	5	10	30	12.42	139.51	5	24	38.5	684.1
6	8	40	15.60	141.10	13	17	06.1	501.7	6	10	32	31.93	139.49	5	13	14.4	686.2
7	8	42	36.70	141.08	13	08	44.4	507.0	7	10	34	51.42	139.45	5	01	48.2	688.3
8	8	44	57.78	141.06	13	00	17.4	512.2	8	10	37	10.87	139.42	4	50	19.9	690.3
9	8	47	18.84	141.03	12	51	45.2	517.4	9	10	39	30.29	139.40	4	38	49.6	692.2
10	8	49	39.87	141.01	12	43	07.8	522.5	10	10	41	49.69	139.38	4	27	17.4	694.1
11	8	52	00.88	140.98	12	34	25.3	527.6	11	10	44	09.07	139.35	4	15	43.3	695.9
12	8	54	21.86	140.96	12	25	37.7	532.6	12	10	46	28.42	139.32	4	04	07.4	697.6
13	8	56	42.82	140.92	12	16	45.1	537.6	13	10	48	47.74	139.30	3	52	29.8	699.1
14	8	59	03.74	140.90	12	07	47.5	542.6	14	10	51	07.04	139.28	3	40	50.7	700.7
15	9	01	24.64	140.87	11	58	44.9	547.4	15	10	53	26.32	139.26	3	29	10.0	702.2
16	9	03	45.51	140.84	11	49	37.5	552.2	16	10	55	45.58	139.24	3	17	27.8	703.5
17	9	06	06.35	140.80	11	40	25.3	556.9	17	10	58	04.82	139.22	3	05	44.3	704.8
18	9	08	27.15	140.77	11	31	08.4	561.7	18	11	00	24.04	139.20	2	53	59.5	706.0
19	9	10	47.92	140.74	11	21	46.7	566.3	19	11	02	43.24	139.19	2	42	13.5	707.1
20	9	13	08.66	140.71	11	12	20.4	570.8	20	11	05	02.43	139.18	2	30	26.4	708.2
21	9	15	29.37	140.67	11	02	49.6	575.4	21	11	07	21.61	139.16	2	18	38.2	709.1
22	9	17	50.04	140.64	10	53	14.2	579.9	22	11	09	40.77	139.14	2	06	49.1	710.0
23	9	20	10.68	140.60	10	43	34.3	-584.2	23	11	11	59.91	139.14	1	54	59.1	-710.8
24	9	22	31.28		+10	33	50.1		24	11	14	19.05		+ 1	43	08.3	

UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination			
AUGUST 21						AUGUST 23								
	h	m	s	s	° ' "	"		h	m	s	s	° ' "	"	
0	14	59	19.35	143.35	-14	55 30.2	-426.4	0	16	54	25.81	143.51	-18 36 10.7	-111.1
1	15	01	42.70	143.40	15	02 36.6	420.4	1	16	56	49.32	143.46	18 38 01.8	104.1
2	15	04	06.10	143.45	15	09 37.0	414.5	2	16	59	12.78	143.39	18 39 45.9	97.3
3	15	06	29.55	143.50	15	16 31.5	408.5	3	17	01	36.17	143.33	18 41 23.2	90.4
4	15	08	53.05	143.55	15	23 20.0	402.4	4	17	03	59.50	143.25	18 42 53.6	83.6
5	15	11	16.60	143.59	15	30 02.4	396.2	5	17	06	22.75	143.18	18 44 17.2	76.7
6	15	13	40.19	143.64	15	36 38.6	390.2	6	17	08	45.93	143.11	18 45 33.9	69.8
7	15	16	03.83	143.68	15	43 08.8	384.0	7	17	11	09.04	143.03	18 46 43.7	63.0
8	15	18	27.51	143.72	15	49 32.8	377.8	8	17	13	32.07	142.95	18 47 46.7	56.1
9	15	20	51.23	143.76	15	55 50.6	371.6	9	17	15	55.02	142.86	18 48 42.8	49.3
10	15	23	14.99	143.80	16	02 02.2	365.3	10	17	18	17.88	142.78	18 49 32.1	42.5
11	15	25	38.79	143.84	16	08 07.5	359.0	11	17	20	40.66	142.68	18 50 14.6	35.7
12	15	28	02.63	143.87	16	14 06.5	352.6	12	17	23	03.34	142.59	18 50 50.3	28.9
13	15	30	26.50	143.90	16	19 59.1	346.3	13	17	25	25.93	142.49	18 51 19.2	22.0
14	15	32	50.40	143.93	16	25 45.4	339.9	14	17	27	48.42	142.40	18 51 41.2	15.3
15	15	35	14.33	143.96	16	31 25.3	333.5	15	17	30	10.82	142.29	18 51 56.5	8.6
16	15	37	38.29	143.98	16	36 58.8	327.0	16	17	32	33.11	142.19	18 52 05.1	- 1.7
17	15	40	02.27	144.01	16	42 25.8	320.5	17	17	34	55.30	142.08	18 52 06.8	+ 4.9
18	15	42	26.28	144.03	16	47 46.3	314.0	18	17	37	17.38	141.97	18 52 01.9	11.7
19	15	44	50.31	144.06	16	53 00.3	307.5	19	17	39	39.35	141.85	18 51 50.2	18.3
20	15	47	14.37	144.06	16	58 07.8	301.0	20	17	42	01.20	141.74	18 51 31.9	25.1
21	15	49	38.43	144.09	17	03 08.8	294.3	21	17	44	22.94	141.61	18 51 06.8	31.7
22	15	52	02.52	144.09	17	08 03.1	287.8	22	17	46	44.55	141.50	18 50 35.1	38.3
23	15	54	26.61	144.11	-17	12 50.9	-281.1	23	17	49	06.05	141.37	-18 49 56.8	+ 45.0
AUGUST 22						AUGUST 24								
0	15	56	50.72	144.12	-17	17 32.0	-274.5	0	17	51	27.42	141.24	-18 49 11.8	+ 51.6
1	15	59	14.84	144.12	17	22 06.5	267.9	1	17	53	48.66	141.11	18 48 20.2	58.2
2	16	01	38.96	144.13	17	26 34.4	261.1	2	17	56	09.77	140.98	18 47 22.0	64.7
3	16	04	03.09	144.12	17	30 55.5	254.4	3	17	58	30.75	140.84	18 46 17.3	71.3
4	16	06	27.21	144.13	17	35 09.9	247.7	4	18	00	51.59	140.70	18 45 06.0	77.7
5	16	08	51.34	144.12	17	39 17.6	241.0	5	18	03	12.29	140.56	18 43 48.3	84.3
6	16	11	15.46	144.11	17	43 18.6	234.2	6	18	05	32.85	140.42	18 42 24.0	90.7
7	16	13	39.57	144.10	17	47 12.8	227.5	7	18	07	53.27	140.27	18 40 53.3	97.2
8	16	16	03.67	144.10	17	51 00.3	220.7	8	18	10	13.54	140.12	18 39 16.1	103.6
9	16	18	27.77	144.07	17	54 41.0	213.9	9	18	12	33.66	139.98	18 37 32.5	110.0
10	16	20	51.84	144.06	17	58 14.9	207.1	10	18	14	53.64	139.81	18 35 42.5	116.3
11	16	23	15.90	144.04	18	01 42.0	200.2	11	18	17	13.45	139.66	18 33 46.2	122.6
12	16	25	39.94	144.02	18	05 02.2	193.4	12	18	19	33.11	139.51	18 31 43.6	129.0
13	16	28	03.96	143.99	18	08 15.6	186.6	13	18	21	52.62	139.34	18 29 34.6	135.2
14	16	30	27.95	143.96	18	11 22.2	179.8	14	18	24	11.96	139.17	18 27 19.4	141.5
15	16	32	51.91	143.93	18	14 22.0	172.9	15	18	26	31.13	139.02	18 24 57.9	147.7
16	16	35	15.84	143.90	18	17 14.9	166.0	16	18	28	50.15	138.84	18 22 30.2	153.8
17	16	37	39.74	143.86	18	20 00.9	159.2	17	18	31	08.99	138.68	18 19 56.4	160.0
18	16	40	03.60	143.82	18	22 40.1	152.3	18	18	33	27.67	138.50	18 17 16.4	166.1
19	16	42	27.42	143.77	18	25 12.4	145.4	19	18	35	46.17	138.33	18 14 30.3	172.2
20	16	44	51.19	143.73	18	27 37.8	138.6	20	18	38	04.50	138.15	18 11 38.1	178.3
21	16	47	14.92	143.68	18	29 56.4	131.6	21	18	40	22.65	137.98	18 08 39.8	184.2
22	16	49	38.60	143.63	18	32 08.0	124.8	22	18	42	40.63	137.79	18 05 35.6	190.2
23	16	52	02.23	143.58	18	34 12.8	-117.9	23	18	44	58.42	137.61	18 02 25.4	+196.2
24	16	54	25.81		-18	36 10.7		24	18	47	16.03		-17 59 09.2	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
AUGUST 25									AUGUST 27									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	18	47	16.03	137.43	-17	59	09.2	+202.1	0	20	33	22.99	127.43	-13	39	10.0	+435.5	
1	18	49	33.46	137.25	17	55	47.1	207.9	1	20	35	30.42	127.22	13	31	54.5	439.3	
2	18	51	50.71	137.05	17	52	19.2	213.8	2	20	37	37.64	127.00	13	24	35.2	442.8	
3	18	54	07.76	136.87	17	48	45.4	219.5	3	20	39	44.64	126.80	13	17	12.4	446.6	
4	18	56	24.63	136.68	17	45	05.9	225.3	4	20	41	51.44	126.58	13	09	45.8	450.0	
5	18	58	41.31	136.48	17	41	20.6	231.1	5	20	43	58.02	126.37	13	02	15.8	453.7	
6	19	00	57.79	136.29	17	37	29.5	236.7	6	20	46	04.39	126.17	12	54	42.1	457.0	
7	19	03	14.08	136.10	17	33	32.8	242.3	7	20	48	10.56	125.96	12	47	05.1	460.6	
8	19	05	30.18	135.90	17	29	30.5	247.9	8	20	50	16.52	125.75	12	39	24.5	463.8	
9	19	07	46.08	135.70	17	25	22.6	253.5	9	20	52	22.27	125.54	12	31	40.7	467.3	
10	19	10	01.78	135.50	17	21	09.1	259.0	10	20	54	27.81	125.34	12	23	53.4	470.5	
11	19	12	17.28	135.30	17	16	50.1	264.5	11	20	56	33.15	125.13	12	16	02.9	473.7	
12	19	14	32.58	135.10	17	12	25.6	269.9	12	20	58	38.28	124.93	12	08	09.2	476.9	
13	19	16	47.68	134.90	17	07	55.7	275.4	13	21	00	43.21	124.73	12	00	12.3	480.0	
14	19	19	02.58	134.69	17	03	20.3	280.6	14	21	02	47.94	124.52	11	52	12.3	483.1	
15	19	21	17.27	134.48	16	58	39.7	286.0	15	21	04	52.46	124.33	11	44	09.2	486.2	
16	19	23	31.75	134.28	16	53	53.7	291.2	16	21	06	56.79	124.12	11	36	03.0	489.2	
17	19	25	46.03	134.07	16	49	02.5	296.5	17	21	09	00.91	123.93	11	27	53.8	492.0	
18	19	28	00.10	133.86	16	44	06.0	301.6	18	21	11	04.84	123.73	11	19	41.8	495.0	
19	19	30	13.96	133.66	16	39	04.4	306.8	19	21	13	08.57	123.54	11	11	26.8	497.8	
20	19	32	27.62	133.44	16	33	57.6	311.8	20	21	15	12.11	123.34	11	03	09.0	500.7	
21	19	34	41.06	133.24	16	28	45.8	316.9	21	21	17	15.45	123.15	10	54	48.3	503.3	
22	19	36	54.30	133.02	16	23	28.9	321.9	22	21	19	18.60	122.95	10	46	25.0	506.1	
23	19	39	07.32	132.81	-16	18	07.0	+326.8	23	21	21	21.55	122.77	-10	37	58.9	+508.7	
AUGUST 26									AUGUST 28									
0	19	41	20.13	132.59	-16	12	40.2	+331.8	0	21	23	24.32	122.57	-10	29	30.2	+511.3	
1	19	43	32.72	132.38	16	07	08.4	336.6	1	21	25	26.89	122.39	10	20	58.9	513.8	
2	19	45	45.10	132.17	16	01	31.8	341.5	2	21	27	29.28	122.21	10	12	25.1	516.4	
3	19	47	57.27	131.96	15	55	50.3	346.2	3	21	29	31.49	122.02	10	03	48.7	518.8	
4	19	50	09.23	131.73	15	50	04.1	350.9	4	21	31	33.51	121.83	9	55	09.9	521.2	
5	19	52	20.96	131.53	15	44	13.2	355.7	5	21	33	35.34	121.66	9	46	28.7	523.6	
6	19	54	32.49	131.31	15	38	17.5	360.2	6	21	35	37.00	121.47	9	37	45.1	525.9	
7	19	56	43.80	131.09	15	32	17.3	364.9	7	21	37	38.47	121.29	9	28	59.2	528.2	
8	19	58	54.89	130.88	15	26	12.4	369.4	8	21	39	39.76	121.12	9	20	11.0	530.4	
9	20	01	05.77	130.66	15	20	03.0	373.8	9	21	41	40.88	120.95	9	11	20.6	532.5	
10	20	03	16.43	130.44	15	13	49.2	378.4	10	21	43	41.83	120.77	9	02	28.1	534.7	
11	20	05	26.87	130.23	15	07	30.8	382.7	11	21	45	42.60	120.59	8	53	33.4	536.8	
12	20	07	37.10	130.01	15	01	08.1	387.1	12	21	47	43.19	120.43	8	44	36.6	538.8	
13	20	09	47.11	129.79	14	54	41.0	391.3	13	21	49	43.62	120.26	8	35	37.8	540.7	
14	20	11	56.90	129.58	14	48	09.7	395.6	14	21	51	43.88	120.09	8	26	37.1	542.7	
15	20	14	06.48	129.36	14	41	34.1	399.9	15	21	53	43.97	119.93	8	17	34.4	544.6	
16	20	16	15.84	129.15	14	34	54.2	404.0	16	21	55	43.90	119.77	8	08	29.8	546.5	
17	20	18	24.99	128.93	14	28	10.2	408.1	17	21	57	43.67	119.60	7	59	23.3	548.2	
18	20	20	33.92	128.72	14	21	22.1	412.1	18	21	59	43.27	119.44	7	50	15.1	550.0	
19	20	22	42.64	128.50	14	14	30.0	416.2	19	22	01	42.71	119.29	7	41	05.1	551.7	
20	20	24	51.14	128.28	14	07	33.8	420.1	20	22	03	42.00	119.13	7	31	53.4	553.4	
21	20	26	59.42	128.07	14	00	33.7	424.1	21	22	05	41.13	118.98	7	22	40.0	555.0	
22	20	29	07.49	127.86	13	53	29.6	427.9	22	22	07	40.11	118.82	7	13	25.0	556.5	
23	20	31	15.35	127.64	13	46	21.7	+431.7	23	22	09	38.93	118.68	7	04	08.5	+558.1	
24	20	33	22.99		-13	39	10.0		24	22	11	37.61		-	6	54	50.4	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
AUGUST 29									AUGUST 31								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	22	11	37.61	118.52	-6	54	50.4	+559.6	0	23	44	18.28	113.92	+0	47	29.4	+581.0
1	22	13	36.13	118.38	6	45	30.8	561.0	1	23	46	12.20	113.87	0	57	10.4	580.6
2	22	15	34.51	118.24	6	36	09.8	562.4	2	23	48	06.07	113.84	1	06	51.0	579.9
3	22	17	32.75	118.09	6	26	47.4	563.7	3	23	49	59.91	113.80	1	16	30.9	579.4
4	22	19	30.84	117.96	6	17	23.7	565.0	4	23	51	53.71	113.77	1	26	10.3	578.7
5	22	21	28.80	117.81	6	07	58.7	566.3	5	23	53	47.48	113.73	1	35	49.0	578.1
6	22	23	26.61	117.68	5	58	32.4	567.5	6	23	55	41.21	113.71	1	45	27.1	577.4
7	22	25	24.29	117.55	5	49	04.9	568.7	7	23	57	34.92	113.67	1	55	04.5	576.7
8	22	27	21.84	117.41	5	39	36.2	569.9	8	23	59	28.59	113.65	2	04	41.2	575.8
9	22	29	19.25	117.28	5	30	06.3	570.9	9	0	01	22.24	113.63	2	14	17.0	575.1
10	22	31	16.53	117.16	5	20	35.4	571.9	10	0	03	15.87	113.61	2	23	52.1	574.2
11	22	33	13.69	117.03	5	11	03.5	572.9	11	0	05	09.48	113.59	2	33	26.3	573.3
12	22	35	10.72	116.90	5	01	30.6	573.9	12	0	07	03.07	113.58	2	42	59.6	572.4
13	22	37	07.62	116.79	4	51	56.7	574.8	13	0	08	56.65	113.56	2	52	32.0	571.5
14	22	39	04.41	116.66	4	42	21.9	575.7	14	0	10	50.21	113.55	3	02	03.5	570.5
15	22	41	01.07	116.55	4	32	46.2	576.5	15	0	12	43.76	113.54	3	11	34.0	569.4
16	22	42	57.62	116.43	4	23	09.7	577.3	16	0	14	37.30	113.54	3	21	03.4	568.4
17	22	44	54.05	116.31	4	13	32.4	578.0	17	0	16	30.84	113.53	3	30	31.8	567.4
18	22	46	50.36	116.21	4	03	54.4	578.8	18	0	18	24.37	113.53	3	39	59.2	566.1
19	22	48	46.57	116.10	3	54	15.6	579.4	19	0	20	17.90	113.52	3	49	25.3	565.1
20	22	50	42.67	115.99	3	44	36.2	580.0	20	0	22	11.42	113.54	3	58	50.4	563.8
21	22	52	38.66	115.89	3	34	56.2	580.6	21	0	24	04.96	113.53	4	08	14.2	562.6
22	22	54	34.55	115.78	3	25	15.6	581.1	22	0	25	58.49	113.54	4	17	36.8	561.3
23	22	56	30.33	115.69	-3	15	34.5	+581.6	23	0	27	52.03	113.55	+4	26	58.1	+560.1
AUGUST 30									SEPTEMBER 1								
0	22	58	26.02	115.58	-3	05	52.9	+582.0	0	0	29	45.58	113.57	+4	36	18.2	+558.7
1	23	00	21.60	115.50	2	56	10.9	582.5	1	0	31	39.15	113.57	4	45	36.9	557.3
2	23	02	17.10	115.39	2	46	28.4	582.8	2	0	33	32.72	113.59	4	54	54.2	556.0
3	23	04	12.49	115.31	2	36	45.6	583.2	3	0	35	26.31	113.61	5	04	10.2	554.5
4	23	06	07.80	115.22	2	27	02.4	583.4	4	0	37	19.92	113.64	5	13	24.7	553.0
5	23	08	03.02	115.13	2	17	19.0	583.7	5	0	39	13.56	113.65	5	22	37.7	551.6
6	23	09	58.15	115.05	2	07	35.3	583.9	6	0	41	07.21	113.68	5	31	49.3	550.0
7	23	11	53.20	114.96	1	57	51.4	584.1	7	0	43	00.89	113.70	5	40	59.3	548.4
8	23	13	48.16	114.89	1	48	07.3	584.2	8	0	44	54.59	113.73	5	50	07.7	546.9
9	23	15	43.05	114.80	1	38	23.1	584.3	9	0	46	48.32	113.77	5	59	14.6	545.2
10	23	17	37.85	114.73	1	28	38.8	584.4	10	0	48	42.09	113.80	6	08	19.8	543.5
11	23	19	32.58	114.66	1	18	54.4	584.4	11	0	50	35.89	113.83	6	17	23.3	541.9
12	23	21	27.24	114.59	1	09	10.0	584.3	12	0	52	29.72	113.87	6	26	25.2	540.1
13	23	23	21.83	114.52	0	59	25.7	584.3	13	0	54	23.59	113.91	6	35	25.3	538.3
14	23	25	16.35	114.45	0	49	41.4	584.2	14	0	56	17.50	113.96	6	44	23.6	536.5
15	23	27	10.80	114.39	0	39	57.2	584.0	15	0	58	11.46	114.00	6	53	20.1	534.7
16	23	29	05.19	114.33	0	30	13.2	583.8	16	1	00	05.46	114.04	7	02	14.8	532.9
17	23	30	59.52	114.27	0	20	29.4	583.7	17	1	01	59.50	114.10	7	11	07.7	530.9
18	23	32	53.79	114.21	0	10	45.7	583.4	18	1	03	53.60	114.14	7	19	58.6	529.1
19	23	34	48.00	114.16	-0	01	02.3	583.0	19	1	05	47.74	114.20	7	28	47.7	527.0
20	23	36	42.16	114.10	+0	08	40.7	582.8	20	1	07	41.94	114.25	7	37	34.7	525.1
21	23	38	36.26	114.06	0	18	23.5	582.4	21	1	09	36.19	114.31	7	46	19.8	523.0
22	23	40	30.32	114.00	0	28	05.9	582.0	22	1	11	30.50	114.37	7	55	02.8	521.0
23	23	42	24.32	113.96	0	37	47.9	+581.5	23	1	13	24.87	114.42	8	03	43.8	+518.9
24	23	44	18.28		+0	47	29.4		24	1	15	19.29		+8	12	22.7	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
SEPTEMBER 2									SEPTEMBER 4									
0	h	m	s	S	°	'	"	"	0	h	m	s	S	°	'	"	"	
0	1	15	19.29	114.50	+	8	12	22.7	+516.7	0	2	48	41.42	119.70	+14	16	09.2	+377.7
1	1	17	13.79	114.55		8	20	59.4	514.6	1	2	50	41.12	119.85	14	22	26.9	374.1
2	1	19	08.34	114.63		8	29	34.0	512.5	2	2	52	40.97	119.99	14	28	41.0	370.4
3	1	21	02.97	114.69		8	38	06.5	510.2	3	2	54	40.96	120.14	14	34	51.4	366.6
4	1	22	57.66	114.77		8	46	36.7	507.9	4	2	56	41.10	120.29	14	40	58.0	362.9
5	1	24	52.43	114.84		8	55	04.6	505.7	5	2	58	41.39	120.45	14	47	00.9	359.2
6	1	26	47.27	114.91		9	03	30.3	503.3	6	3	00	41.84	120.59	14	53	00.1	355.3
7	1	28	42.18	114.99		9	11	53.6	501.0	7	3	02	42.43	120.75	14	58	55.4	351.4
8	1	30	37.17	115.07		9	20	14.6	498.6	8	3	04	43.18	120.91	15	04	46.8	347.6
9	1	32	32.24	115.16		9	28	33.2	496.3	9	3	06	44.09	121.06	15	10	34.4	343.7
10	1	34	27.40	115.23		9	36	49.5	493.7	10	3	08	45.15	121.22	15	16	18.1	339.7
11	1	36	22.63	115.32		9	45	03.2	491.3	11	3	10	46.37	121.37	15	21	57.8	335.8
12	1	38	17.95	115.41		9	53	14.5	488.8	12	3	12	47.74	121.54	15	27	33.6	331.7
13	1	40	13.36	115.50		10	01	23.3	486.3	13	3	14	49.28	121.69	15	33	05.3	327.7
14	1	42	08.86	115.59		10	09	29.6	483.7	14	3	16	50.97	121.86	15	38	33.0	323.7
15	1	44	04.45	115.68		10	17	33.3	481.1	15	3	18	52.83	122.01	15	43	56.7	319.5
16	1	46	00.13	115.77		10	25	34.4	478.5	16	3	20	54.84	122.18	15	49	16.2	315.4
17	1	47	55.90	115.88		10	33	32.9	475.8	17	3	22	57.02	122.34	15	54	31.6	311.3
18	1	49	51.78	115.97		10	41	28.7	473.1	18	3	24	59.36	122.51	15	59	42.9	307.1
19	1	51	47.75	116.07		10	49	21.8	470.3	19	3	27	01.87	122.67	16	04	50.0	302.8
20	1	53	43.82	116.17		10	57	12.1	467.7	20	3	29	04.54	122.83	16	09	52.8	298.6
21	1	55	39.99	116.28		11	04	59.8	464.8	21	3	31	07.37	123.01	16	14	51.4	294.4
22	1	57	36.27	116.38		11	12	44.6	462.0	22	3	33	10.38	123.16	16	19	45.8	290.0
23	1	59	32.65	116.49		+11	20	26.6	+459.2	23	3	35	13.54	123.34	+16	24	35.8	+285.7
SEPTEMBER 3									SEPTEMBER 5									
0	2	01	29.14	116.60		+11	28	05.8	+456.3	0	3	37	16.88	123.50	+16	29	21.5	+281.3
1	2	03	25.74	116.71		11	35	42.1	453.3	1	3	39	20.38	123.68	16	34	02.8	276.9
2	2	05	22.45	116.83		11	43	15.4	450.5	2	3	41	24.06	123.84	16	38	39.7	272.4
3	2	07	19.28	116.93		11	50	45.9	447.4	3	3	43	27.90	124.01	16	43	12.1	268.0
4	2	09	16.21	117.06		11	58	13.3	444.5	4	3	45	31.91	124.18	16	47	40.1	263.6
5	2	11	13.27	117.17		12	05	37.8	441.4	5	3	47	36.09	124.36	16	52	03.7	258.9
6	2	13	10.44	117.29		12	12	59.2	438.3	6	3	49	40.45	124.52	16	56	22.6	254.5
7	2	15	07.73	117.41		12	20	17.5	435.2	7	3	51	44.97	124.69	17	00	37.1	249.8
8	2	17	05.14	117.53		12	27	32.7	432.1	8	3	53	49.66	124.87	17	04	46.9	245.3
9	2	19	02.67	117.66		12	34	44.8	429.0	9	3	55	54.53	125.04	17	08	52.2	240.6
10	2	21	00.33	117.78		12	41	53.8	425.7	10	3	57	59.57	125.21	17	12	52.8	235.9
11	2	22	58.11	117.92		12	48	59.5	422.5	11	4	00	04.78	125.39	17	16	48.7	231.2
12	2	24	56.03	118.03		12	56	02.0	419.3	12	4	02	10.17	125.55	17	20	39.9	226.5
13	2	26	54.06	118.18		13	03	01.3	415.9	13	4	04	15.72	125.73	17	24	26.4	221.7
14	2	28	52.24	118.30		13	09	57.2	412.7	14	4	06	21.45	125.91	17	28	08.1	216.9
15	2	30	50.54	118.43		13	16	49.9	409.3	15	4	08	27.36	126.07	17	31	45.0	212.1
16	2	32	48.97	118.57		13	23	39.2	405.9	16	4	10	33.43	126.25	17	35	17.1	207.3
17	2	34	47.54	118.71		13	30	25.1	402.5	17	4	12	39.68	126.43	17	38	44.4	202.3
18	2	36	46.25	118.84		13	37	07.6	399.0	18	4	14	46.11	126.59	17	42	06.7	197.5
19	2	38	45.09	118.99		13	43	46.6	395.6	19	4	16	52.70	126.77	17	45	24.2	192.5
20	2	40	44.08	119.12		13	50	22.2	392.1	20	4	18	59.47	126.95	17	48	36.7	187.6
21	2	42	43.20	119.26		13	56	54.3	388.5	21	4	21	06.42	127.11	17	51	44.3	182.6
22	2	44	42.46	119.41		14	03	22.8	385.0	22	4	23	13.53	127.29	17	54	46.9	177.5
23	2	46	41.87	119.55		14	09	47.8	+381.4	23	4	25	20.82	127.47	17	57	44.4	+172.5
24	2	48	41.42			+14	16	09.2		24	4	27	28.29		+18	00	36.9	

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
SEPTEMBER 6						SEPTEMBER 8					
	h	m	s	s	° ' "		h	m	s	s	° ' "
0	4	27	28.29		+18 00 36.9	0	6	12	38.77		+18 31 13.5
1	4	29	35.92	127.63	18 03 24.3	1	6	14	53.85	135.08	18 29 28.7
2	4	31	43.73	127.81	18 06 06.6	2	6	17	09.05	135.20	18 27 37.7
3	4	33	51.71	127.98	18 08 43.8	3	6	19	24.38	135.33	18 25 40.5
4	4	35	59.87	128.16	18 11 15.7	4	6	21	39.84	135.46	18 23 37.3
5	4	38	08.19	128.32	18 13 42.6	5	6	23	55.41	135.57	18 21 27.8
6	4	40	16.69	128.50	18 16 04.1	6	6	26	11.10	135.69	18 19 12.2
7	4	42	25.36	128.67	18 18 20.5	7	6	28	26.91	135.81	18 16 50.5
8	4	44	34.19	128.83	18 20 31.6	8	6	30	42.84	135.93	18 14 22.5
9	4	46	43.20	129.01	18 22 37.3	9	6	32	58.88	136.04	18 11 48.4
10	4	48	52.38	129.18	18 24 37.8	10	6	35	15.04	136.16	18 09 08.0
11	4	51	01.73	129.35	18 26 32.9	11	6	37	31.30	136.26	18 06 21.5
12	4	53	11.24	129.51	18 28 22.6	12	6	39	47.68	136.38	18 03 28.7
13	4	55	20.92	129.68	18 30 06.9	13	6	42	04.16	136.48	18 00 29.8
14	4	57	30.78	129.86	18 31 45.8	14	6	44	20.75	136.59	17 57 24.6
15	4	59	40.79	130.01	18 33 19.2	15	6	46	37.44	136.69	17 54 13.2
16	5	01	50.98	130.19	18 34 47.1	16	6	48	54.24	136.80	17 50 55.5
17	5	04	01.33	130.35	18 36 09.6	17	6	51	11.14	136.90	17 47 31.7
18	5	06	11.84	130.51	18 37 26.5	18	6	53	28.13	136.99	17 44 01.6
19	5	08	22.52	130.68	18 38 37.8	19	6	55	45.23	137.10	17 40 25.3
20	5	10	33.36	130.84	18 39 43.6	20	6	58	02.42	137.19	17 36 42.7
21	5	12	44.36	131.00	18 40 43.8	21	7	00	19.71	137.29	17 32 54.0
22	5	14	55.52	131.16	18 41 38.3	22	7	02	37.08	137.37	17 28 59.0
23	5	17	06.84	131.32	+18 42 27.2	23	7	04	54.55	137.47	+17 24 57.7
				131.49	+43.2					137.56	-247.4
SEPTEMBER 7						SEPTEMBER 9					
0	5	19	18.33		+18 43 10.4	0	7	07	12.11		+17 20 50.3
1	5	21	29.97	131.64	18 43 48.0	1	7	09	29.76	137.65	17 16 36.6
2	5	23	41.77	131.80	18 44 19.8	2	7	11	47.49	137.73	17 12 16.7
3	5	25	53.72	131.95	18 44 45.9	3	7	14	05.31	137.82	17 07 50.6
4	5	28	05.83	132.11	18 45 06.2	4	7	16	23.21	137.90	17 03 18.3
5	5	30	18.09	132.26	18 45 20.7	5	7	18	41.19	137.98	16 58 39.8
6	5	32	30.51	132.42	18 45 29.4	6	7	20	59.25	138.06	16 53 55.1
7	5	34	43.08	132.57	18 45 32.4	7	7	23	17.39	138.14	16 49 04.3
8	5	36	55.80	132.72	18 45 29.4	8	7	25	35.60	138.21	16 44 07.2
9	5	39	08.67	132.87	18 45 20.7	9	7	27	53.89	138.29	16 39 04.0
10	5	41	21.69	133.02	18 45 06.0	10	7	30	12.26	138.37	16 33 54.7
11	5	43	34.85	133.16	18 44 45.4	11	7	32	30.69	138.43	16 28 39.2
12	5	45	48.16	133.31	18 44 18.9	12	7	34	49.19	138.50	16 23 17.5
13	5	48	01.62	133.46	18 43 46.5	13	7	37	07.77	138.58	16 17 49.8
14	5	50	15.22	133.60	18 43 08.1	14	7	39	26.41	138.64	16 12 15.9
15	5	52	28.96	133.74	18 42 23.8	15	7	41	45.11	138.70	16 06 36.0
16	5	54	42.84	133.88	18 41 33.5	16	7	44	03.88	138.77	16 00 50.0
17	5	56	56.86	134.02	18 40 37.1	17	7	46	22.71	138.83	15 54 57.9
18	5	59	11.01	134.15	18 39 34.8	18	7	48	41.60	138.89	15 48 59.8
19	6	01	25.31	134.30	18 38 26.4	19	7	51	00.55	138.95	15 42 55.6
20	6	03	39.74	134.43	18 37 12.0	20	7	53	19.56	139.01	15 36 45.5
21	6	05	54.30	134.56	18 35 51.5	21	7	55	38.63	139.07	15 30 29.4
22	6	08	08.99	134.69	18 34 24.9	22	7	57	57.75	139.12	15 24 07.3
23	6	10	23.82	134.83	18 32 52.3	23	8	00	16.92	139.17	15 17 39.2
24	6	12	38.77	134.95	+18 31 13.5	24	8	02	36.15	139.23	+15 11 05.3

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
SEPTEMBER 10									SEPTEMBER 12								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	8	02	36.15	139.28	+15	11	05.3	-399.8	0	9	54	41.69	140.77	+8	11	01.6	-637.5
1	8	04	55.43	139.33	15	04	25.5	405.8	1	9	57	02.46	140.79	8	00	24.1	641.1
2	8	07	14.76	139.37	14	57	39.7	411.5	2	9	59	23.25	140.82	7	49	43.0	644.7
3	8	09	34.13	139.43	14	50	48.2	417.4	3	10	01	44.07	140.85	7	38	58.3	648.2
4	8	11	53.56	139.47	14	43	50.8	423.2	4	10	04	04.92	140.87	7	28	10.1	651.7
5	8	14	13.03	139.51	14	36	47.6	429.0	5	10	06	25.79	140.89	7	17	18.4	655.0
6	8	16	32.54	139.56	14	29	38.6	434.6	6	10	08	46.68	140.92	7	06	23.4	658.2
7	8	18	52.10	139.60	14	22	24.0	440.4	7	10	11	07.60	140.95	6	55	25.2	661.5
8	8	21	11.70	139.65	14	15	03.6	446.1	8	10	13	28.55	140.97	6	44	23.7	664.6
9	8	23	31.35	139.68	14	07	37.5	451.7	9	10	15	49.52	141.00	6	33	19.1	667.7
10	8	25	51.03	139.73	14	00	05.8	457.3	10	10	18	10.52	141.03	6	22	11.4	670.7
11	8	28	10.76	139.76	13	52	28.5	462.9	11	10	20	31.55	141.06	6	11	00.7	673.6
12	8	30	30.52	139.80	13	44	45.6	468.5	12	10	22	52.61	141.09	5	59	47.1	676.4
13	8	32	50.32	139.84	13	36	57.1	474.0	13	10	25	13.70	141.11	5	48	30.7	679.2
14	8	35	10.16	139.87	13	29	03.1	479.4	14	10	27	34.81	141.14	5	37	11.5	681.9
15	8	37	30.03	139.90	13	21	03.7	484.9	15	10	29	55.95	141.18	5	25	49.6	684.5
16	8	39	49.93	139.94	13	12	58.8	490.3	16	10	32	17.13	141.21	5	14	25.1	687.1
17	8	42	09.87	139.98	13	04	48.5	495.6	17	10	34	38.34	141.23	5	02	58.0	689.5
18	8	44	29.85	140.00	12	56	32.9	501.0	18	10	36	59.57	141.27	4	51	28.5	691.8
19	8	46	49.85	140.04	12	48	11.9	506.2	19	10	39	20.84	141.31	4	39	56.7	694.2
20	8	49	09.89	140.07	12	39	45.7	511.5	20	10	41	42.15	141.33	4	28	22.5	696.3
21	8	51	29.96	140.10	12	31	14.2	516.6	21	10	44	03.48	141.37	4	16	46.2	698.5
22	8	53	50.06	140.12	12	22	37.6	521.9	22	10	46	24.85	141.41	4	05	07.7	700.6
23	8	56	10.18	140.16	+12	13	55.7	-526.9	23	10	48	46.26	141.44	+3	53	27.1	-702.5
SEPTEMBER 11									SEPTEMBER 13								
0	8	58	30.34	140.19	+12	05	08.8	-532.0	0	10	51	07.70	141.48	+3	41	44.6	-704.3
1	9	00	50.53	140.21	11	56	16.8	537.0	1	10	53	29.18	141.52	3	30	00.3	706.2
2	9	03	10.74	140.24	11	47	19.8	542.0	2	10	55	50.70	141.56	3	18	14.1	707.9
3	9	05	30.98	140.26	11	38	17.8	546.9	3	10	58	12.26	141.59	3	06	26.2	709.5
4	9	07	51.24	140.29	11	29	10.9	551.8	4	11	00	33.85	141.64	2	54	36.7	711.1
5	9	10	11.53	140.32	11	19	59.1	556.6	5	11	02	55.49	141.67	2	42	45.6	712.5
6	9	12	31.85	140.35	11	10	42.5	561.4	6	11	05	17.16	141.72	2	30	53.1	713.9
7	9	14	52.20	140.36	11	01	21.1	566.1	7	11	07	38.88	141.76	2	18	59.2	715.2
8	9	17	12.56	140.40	10	51	55.0	570.7	8	11	10	00.64	141.81	2	07	04.0	716.4
9	9	19	32.96	140.41	10	42	24.3	575.4	9	11	12	22.45	141.84	1	55	07.6	717.4
10	9	21	53.37	140.44	10	32	48.9	579.9	10	11	14	44.29	141.90	1	43	10.2	718.5
11	9	24	13.81	140.47	10	23	09.0	584.4	11	11	17	06.19	141.94	1	31	11.7	719.5
12	9	26	34.28	140.49	10	13	24.6	588.9	12	11	19	28.13	141.99	1	19	12.2	720.2
13	9	28	54.77	140.51	10	03	35.7	593.3	13	11	21	50.12	142.03	1	07	12.0	721.1
14	9	31	15.28	140.54	9	53	42.4	597.6	14	11	24	12.15	142.08	0	55	10.9	721.7
15	9	33	35.82	140.55	9	43	44.8	601.8	15	11	26	34.23	142.14	0	43	09.2	722.3
16	9	35	56.37	140.59	9	33	43.0	606.1	16	11	28	56.37	142.18	0	31	06.9	722.7
17	9	38	16.96	140.60	9	23	36.9	610.2	17	11	31	18.55	142.24	0	19	04.2	723.2
18	9	40	37.56	140.63	9	13	26.7	614.4	18	11	33	40.79	142.29	+0	07	01.0	723.4
19	9	42	58.19	140.65	9	03	12.3	618.3	19	11	36	03.08	142.34	-0	05	02.4	723.7
20	9	45	18.84	140.68	8	52	54.0	622.3	20	11	38	25.42	142.40	0	17	06.1	723.8
21	9	47	39.52	140.70	8	42	31.7	626.2	21	11	40	47.82	142.45	0	29	09.9	723.9
22	9	50	00.22	140.72	8	32	05.5	630.1	22	11	43	10.27	142.51	0	41	13.8	723.8
23	9	52	20.94	140.75	8	21	35.4	-633.8	23	11	45	32.78	142.56	0	53	17.6	-723.6
24	9	54	41.69		+8	11	01.6		24	11	47	55.34		-1	05	21.2	

UNIVERSAL TIME

Hour	Right Ascension	Declination	Hour	Right Ascension	Declination
SEPTEMBER 14			SEPTEMBER 16		
	h m s s	° ' " "		h m s s	° ' " "
0	11 47 55.34 142.63	- 1 05 21.2 -723.4	0	13 43 19.00 146.06	-10 11 43.5 -606.5
1	11 50 17.97 142.68	1 17 24.6 723.1	1	13 45 45.06 146.13	10 21 50.0 602.1
2	11 52 40.65 142.74	1 29 27.7 722.6	2	13 48 11.19 146.20	10 31 52.1 597.5
3	11 55 03.39 142.80	1 41 30.3 722.2	3	13 50 37.39 146.27	10 41 49.6 592.9
4	11 57 26.19 142.87	1 53 32.5 721.5	4	13 53 03.66 146.35	10 51 42.5 588.2
5	11 59 49.06 142.92	2 05 34.0 720.8	5	13 55 30.01 146.41	11 01 30.7 583.4
6	12 02 11.98 142.99	2 17 34.8 720.1	6	13 57 56.42 146.47	11 11 14.1 578.5
7	12 04 34.97 143.05	2 29 34.9 719.1	7	14 00 22.89 146.55	11 20 52.6 573.7
8	12 06 58.02 143.12	2 41 34.0 718.2	8	14 02 49.44 146.61	11 30 26.3 568.7
9	12 09 21.14 143.18	2 53 32.2 717.1	9	14 05 16.05 146.68	11 39 55.0 563.6
10	12 11 44.32 143.25	3 05 29.3 716.0	10	14 07 42.73 146.74	11 49 18.6 558.5
11	12 14 07.57 143.32	3 17 25.3 714.7	11	14 10 09.47 146.80	11 58 37.1 553.4
12	12 16 30.89 143.39	3 29 20.0 713.4	12	14 12 36.27 146.86	12 07 50.5 548.1
13	12 18 54.28 143.45	3 41 13.4 711.9	13	14 15 03.13 146.92	12 16 58.6 542.7
14	12 21 17.73 143.52	3 53 05.3 710.4	14	14 17 30.05 146.99	12 26 01.3 537.4
15	12 23 41.25 143.59	4 04 55.7 708.8	15	14 19 57.04 147.03	12 34 58.7 532.0
16	12 26 04.84 143.66	4 16 44.5 707.1	16	14 22 24.07 147.10	12 43 50.7 526.5
17	12 28 28.50 143.74	4 28 31.6 705.3	17	14 24 51.17 147.15	12 52 37.2 520.9
18	12 30 52.24 143.80	4 40 16.9 703.4	18	14 27 18.32 147.20	13 01 18.1 515.3
19	12 33 16.04 143.88	4 52 00.3 701.5	19	14 29 45.52 147.25	13 09 53.4 509.7
20	12 35 39.92 143.95	5 03 41.8 699.3	20	14 32 12.77 147.31	13 18 23.1 503.9
21	12 38 03.87 144.02	5 15 21.1 697.3	21	14 34 40.08 147.34	13 26 47.0 498.2
22	12 40 27.89 144.10	5 26 58.4 694.9	22	14 37 07.42 147.40	13 35 05.2 492.2
23	12 42 51.99 144.17	- 5 38 33.3 -692.6	23	14 39 34.82 147.44	-13 43 17.4 -486.4
SEPTEMBER 15			SEPTEMBER 17		
	h m s s	° ' " "		h m s s	° ' " "
0	12 45 16.16 144.24	- 5 50 05.9 -690.2	0	14 42 02.26 147.48	-13 51 23.8 -480.5
1	12 47 40.40 144.32	6 01 36.1 687.7	1	14 44 29.74 147.53	13 59 24.3 474.5
2	12 50 04.72 144.40	6 13 03.8 685.1	2	14 46 57.27 147.56	14 07 18.8 468.4
3	12 52 29.12 144.47	6 24 28.9 682.4	3	14 49 24.83 147.60	14 15 07.2 462.3
4	12 54 53.59 144.55	6 35 51.3 679.6	4	14 51 52.43 147.63	14 22 49.5 456.1
5	12 57 18.14 144.62	6 47 10.9 676.8	5	14 54 20.06 147.66	14 30 25.6 450.0
6	12 59 42.76 144.70	6 58 27.7 673.8	6	14 56 47.72 147.70	14 37 55.6 443.7
7	13 02 07.46 144.77	7 09 41.5 670.7	7	14 59 15.42 147.72	14 45 19.3 437.5
8	13 04 32.23 144.85	7 20 52.2 667.7	8	15 01 43.14 147.75	14 52 36.8 431.1
9	13 06 57.08 144.93	7 31 59.9 664.4	9	15 04 10.89 147.77	14 59 47.9 424.8
10	13 09 22.01 145.01	7 43 04.3 661.2	10	15 06 38.66 147.79	15 06 52.7 418.3
11	13 11 47.02 145.08	7 54 05.5 657.8	11	15 09 06.45 147.81	15 13 51.0 411.9
12	13 14 12.10 145.16	8 05 03.3 654.3	12	15 11 34.26 147.82	15 20 42.9 405.4
13	13 16 37.26 145.23	8 15 57.6 650.7	13	15 14 02.08 147.84	15 27 28.3 398.9
14	13 19 02.49 145.31	8 26 48.3 647.2	14	15 16 29.92 147.85	15 34 07.2 392.3
15	13 21 27.80 145.39	8 37 35.5 643.4	15	15 18 57.77 147.86	15 40 39.5 385.7
16	13 23 53.19 145.47	8 48 18.9 639.7	16	15 21 25.63 147.87	15 47 05.2 379.1
17	13 26 18.66 145.54	8 58 58.6 635.7	17	15 23 53.50 147.86	15 53 24.3 372.4
18	13 28 44.20 145.61	9 09 34.3 631.9	18	15 26 21.36 147.87	15 59 36.7 365.7
19	13 31 09.81 145.69	9 20 06.2 627.8	19	15 28 49.23 147.86	16 05 42.4 358.9
20	13 33 35.50 145.76	9 30 34.0 623.7	20	15 31 17.09 147.86	16 11 41.3 352.3
21	13 36 01.26 145.84	9 40 57.7 619.6	21	15 33 44.95 147.86	16 17 33.6 345.4
22	13 38 27.10 145.91	9 51 17.3 615.3	22	15 36 12.81 147.84	16 23 19.0 338.6
23	13 40 53.01 145.99	10 01 32.6 -610.9	23	15 38 40.65 147.82	16 28 57.6 -331.7
24	13 43 19.00	-10 11 43.5	24	15 41 08.47	-16 34 29.3

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
SEPTEMBER 18									SEPTEMBER 20								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	15	41	08.47	147.81	-16	34	29.3	-324.9	0	17	38	06.89	143.32	-18	41	48.5	+12.8
1	15	43	36.28	147.79	16	39	54.2	318.0	1	17	40	30.21	143.15	18	41	35.7	19.4
2	15	46	04.07	147.77	16	45	12.2	311.0	2	17	42	53.36	142.99	18	41	16.3	26.3
3	15	48	31.84	147.74	16	50	23.2	304.1	3	17	45	16.35	142.81	18	40	50.0	33.0
4	15	50	59.58	147.72	16	55	27.3	297.2	4	17	47	39.16	142.63	18	40	17.0	39.6
5	15	53	27.30	147.68	17	00	24.5	290.2	5	17	50	01.79	142.46	18	39	37.4	46.4
6	15	55	54.98	147.65	17	05	14.7	283.1	6	17	52	24.25	142.28	18	38	51.0	53.0
7	15	58	22.63	147.60	17	09	57.8	276.2	7	17	54	46.53	142.09	18	37	58.0	59.6
8	16	00	50.23	147.57	17	14	34.0	269.1	8	17	57	08.62	141.91	18	36	58.4	66.2
9	16	03	17.80	147.53	17	19	03.1	262.1	9	17	59	30.53	141.72	18	35	52.2	72.7
10	16	05	45.33	147.47	17	23	25.2	255.1	10	18	01	52.25	141.54	18	34	39.5	79.3
11	16	08	12.80	147.43	17	27	40.3	247.9	11	18	04	13.79	141.34	18	33	20.2	85.7
12	16	10	40.23	147.37	17	31	48.2	240.9	12	18	06	35.13	141.14	18	31	54.5	92.2
13	16	13	07.60	147.32	17	35	49.1	233.8	13	18	08	56.27	140.95	18	30	22.3	98.7
14	16	15	34.92	147.25	17	39	42.9	226.6	14	18	11	17.22	140.75	18	28	43.6	105.0
15	16	18	02.17	147.19	17	43	29.5	219.6	15	18	13	37.97	140.55	18	26	58.6	111.4
16	16	20	29.36	147.13	17	47	09.1	212.4	16	18	15	58.52	140.35	18	25	07.2	117.8
17	16	22	56.49	147.06	17	50	41.5	205.3	17	18	18	18.87	140.14	18	23	09.4	124.0
18	16	25	23.55	146.98	17	54	06.8	198.2	18	18	20	39.01	139.94	18	21	05.4	130.3
19	16	27	50.53	146.91	17	57	25.0	191.1	19	18	22	58.95	139.73	18	18	55.1	136.5
20	16	30	17.44	146.82	18	00	36.1	183.9	20	18	25	18.68	139.52	18	16	38.6	142.7
21	16	32	44.26	146.75	18	03	40.0	176.8	21	18	27	38.20	139.31	18	14	15.9	148.8
22	16	35	11.01	146.66	18	06	36.8	169.7	22	18	29	57.51	139.09	18	11	47.1	154.9
23	16	37	37.67	146.57	-18	09	26.5	-162.5	23	18	32	16.60	138.88	-18	09	12.2	+161.0
SEPTEMBER 19									SEPTEMBER 21								
0	16	40	04.24	146.47	-18	12	09.0	-155.4	0	18	34	35.48	138.67	-18	06	31.2	+167.1
1	16	42	30.71	146.38	18	14	44.4	148.3	1	18	36	54.15	138.45	18	03	44.1	173.0
2	16	44	57.09	146.29	18	17	12.7	141.1	2	18	39	12.60	138.22	18	00	51.1	179.0
3	16	47	23.38	146.18	18	19	33.8	134.0	3	18	41	30.82	138.01	17	57	52.1	184.9
4	16	49	49.56	146.07	18	21	47.8	126.9	4	18	43	48.83	137.79	17	54	47.2	190.8
5	16	52	15.63	145.97	18	23	54.7	119.7	5	18	46	06.62	137.56	17	51	36.4	196.6
6	16	54	41.60	145.85	18	25	54.4	112.7	6	18	48	24.18	137.34	17	48	19.8	202.4
7	16	57	07.45	145.74	18	27	47.1	105.6	7	18	50	41.52	137.12	17	44	57.4	208.2
8	16	59	33.19	145.62	18	29	32.7	98.5	8	18	52	58.64	136.88	17	41	29.2	213.9
9	17	01	58.81	145.50	18	31	11.2	91.5	9	18	55	15.52	136.66	17	37	55.3	219.5
10	17	04	24.31	145.38	18	32	42.7	84.3	10	18	57	32.18	136.44	17	34	15.8	225.2
11	17	06	49.69	145.25	18	34	07.0	77.4	11	18	59	48.62	136.20	17	30	30.6	230.8
12	17	09	14.94	145.11	18	35	24.4	70.3	12	19	02	04.82	135.97	17	26	39.8	236.3
13	17	11	40.05	144.99	18	36	34.7	63.2	13	19	04	20.79	135.74	17	22	43.5	241.8
14	17	14	05.04	144.85	18	37	37.9	56.3	14	19	06	36.53	135.51	17	18	41.7	247.3
15	17	16	29.89	144.70	18	38	34.2	49.3	15	19	08	52.04	135.28	17	14	34.4	252.7
16	17	18	54.59	144.57	18	39	23.5	42.3	16	19	11	07.32	135.04	17	10	21.7	258.1
17	17	21	19.16	144.42	18	40	05.8	35.3	17	19	13	22.36	134.81	17	06	03.6	263.4
18	17	23	43.58	144.27	18	40	41.1	28.5	18	19	15	37.17	134.58	17	01	40.2	268.7
19	17	26	07.85	144.12	18	41	09.6	21.5	19	19	17	51.75	134.34	16	57	11.5	273.9
20	17	28	31.97	143.97	18	41	31.1	14.6	20	19	20	06.09	134.11	16	52	37.6	279.1
21	17	30	55.94	143.81	18	41	45.7	7.8	21	19	22	20.20	133.87	16	47	58.5	284.3
22	17	33	19.75	143.65	18	41	53.5	-0.9	22	19	24	34.07	133.64	16	43	14.2	289.4
23	17	35	43.40	143.49	18	41	54.4	+5.9	23	19	26	47.71	133.40	16	38	24.8	+294.4
24	17	38	06.89		-18	41	48.5		24	19	29	01.11		-16	33	30.4	

UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
SEPTEMBER 22						SEPTEMBER 24					
	h	m	s	s	° ' " "		h	m	s	s	° ' " "
0	19	29	01.11		-16 33 30.4	0	21	11	13.73		-11 13 46.6
1	19	31	14.27	133.16	+299.5	1	21	13	16.22	122.49	+486.0
2	19	33	27.20	132.93	304.4	2	21	15	18.52	122.30	488.7
3	19	35	39.89	132.69	309.3	3	21	17	20.62	122.10	10 57 31.9
4	19	37	52.34	132.45	314.3	4	21	19	22.54	121.92	491.5
5	19	40	04.56	132.22	319.1	5	21	21	24.27	121.73	494.2
6	19	42	16.54	131.98	323.8	6	21	23	25.81	121.54	496.8
7	19	44	28.29	131.75	328.6	7	21	25	27.17	121.36	499.3
8	19	46	39.79	131.50	333.3	8	21	27	28.35	121.18	10 24 30.1
9	19	48	51.07	131.28	338.0	9	21	29	29.34	120.99	10 16 08.2
10	19	51	02.11	131.04	342.5	10	21	31	30.16	120.82	10 07 43.8
11	19	53	12.91	130.80	347.1	11	21	33	30.81	120.65	9 59 16.9
12	19	55	23.47	130.56	351.7	12	21	35	31.27	120.46	9 50 47.6
13	19	57	33.81	130.34	356.1	13	21	37	31.57	120.30	9 42 16.0
14	19	59	43.90	130.09	360.5	14	21	39	31.69	120.12	9 33 42.1
15	20	01	53.77	129.87	364.9	15	21	41	31.65	119.96	9 25 05.9
16	20	04	03.40	129.63	369.2	16	21	43	31.43	119.78	9 16 27.4
17	20	06	12.80	129.40	373.5	17	21	45	31.06	119.63	9 07 46.8
18	20	08	21.96	129.16	377.7	18	21	47	30.52	119.46	8 59 04.0
19	20	10	30.90	128.94	381.9	19	21	49	29.82	119.30	8 50 19.2
20	20	12	39.60	128.70	386.1	20	21	51	28.96	119.14	8 41 32.2
21	20	14	48.08	128.48	390.1	21	21	53	27.94	118.98	8 32 43.3
22	20	16	56.32	128.24	394.2	22	21	55	26.77	118.83	8 23 52.4
23	20	19	04.34	128.02	398.2	23	21	57	25.44	118.67	8 14 59.5
				127.79	+402.2					118.53	8 06 04.8
SEPTEMBER 23						SEPTEMBER 25					
0	20	21	12.13		-14 12 24.2	0	21	59	23.97		- 7 48 09.9
1	20	23	19.69	127.56	+406.1	1	22	01	22.34	118.37	+540.2
2	20	25	27.03	127.34	409.9	2	22	03	20.57	118.23	7 39 09.7
3	20	27	34.14	127.11	413.7	3	22	05	18.66	118.09	7 30 07.9
4	20	29	41.03	126.89	417.5	4	22	07	16.60	117.94	7 21 04.3
5	20	31	47.69	126.66	421.3	5	22	09	14.40	117.80	7 11 59.2
6	20	33	54.14	126.45	424.9	6	22	11	12.06	117.66	7 02 52.4
7	20	36	00.36	126.22	428.5	7	22	13	09.59	117.53	6 53 44.1
8	20	38	06.37	126.01	432.1	8	22	15	06.98	117.39	6 44 34.3
9	20	40	12.15	125.78	435.7	9	22	17	04.25	117.27	6 35 23.0
10	20	42	17.73	125.58	439.1	10	22	19	01.38	117.13	6 26 10.3
11	20	44	23.08	125.35	442.6	11	22	20	58.38	117.00	6 16 56.3
12	20	46	28.22	125.14	446.0	12	22	22	55.26	116.88	6 07 40.8
13	20	48	33.15	124.93	449.3	13	22	24	52.02	116.76	5 58 24.1
14	20	50	37.87	124.72	452.7	14	22	26	48.65	116.63	5 49 06.1
15	20	52	42.37	124.50	455.9	15	22	28	45.17	116.52	5 39 46.9
16	20	54	46.67	124.30	459.1	16	22	30	41.57	116.40	5 30 26.6
17	20	56	50.76	124.09	462.3	17	22	32	37.86	116.29	5 21 05.1
18	20	58	54.65	123.89	465.4	18	22	34	34.03	116.17	5 11 42.5
19	21	00	58.33	123.68	468.5	19	22	36	30.10	116.07	5 02 18.8
20	21	03	01.81	123.48	471.5	20	22	38	26.05	115.95	4 52 54.1
21	21	05	05.08	123.27	474.5	21	22	40	21.91	115.86	4 43 28.5
22	21	07	08.16	123.08	477.4	22	22	42	17.65	115.74	4 34 01.9
23	21	09	11.04	122.88	480.4	23	22	44	13.30	115.65	4 24 34.4
24	21	11	13.73	122.09	+483.2	24	22	46	08.85	115.55	4 15 06.0

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
SEPTEMBER 26									SEPTEMBER 28									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	22	46	08.85	115.45	-4	05	36.9	+569.9	0	0	17	22.70	113.42	+	3	33	05.0	+562.2
1	22	48	04.30	115.36	3	56	07.0	570.7	1	0	19	16.12	113.44	3	42	27.2	561.3	
2	22	49	59.66	115.26	3	46	36.3	571.4	2	0	21	09.56	113.44	3	51	48.5	560.1	
3	22	51	54.92	115.18	3	37	04.9	572.0	3	0	23	03.00	113.46	4	01	08.6	558.9	
4	22	53	50.10	115.09	3	27	32.9	572.6	4	0	24	56.46	113.48	4	10	27.5	557.8	
5	22	55	45.19	115.00	3	18	00.3	573.3	5	0	26	49.94	113.50	4	19	45.3	556.7	
6	22	57	40.19	114.92	3	08	27.0	573.7	6	0	28	43.44	113.52	4	29	02.0	555.3	
7	22	59	35.11	114.84	2	58	53.3	574.3	7	0	30	36.96	113.54	4	38	17.3	554.1	
8	23	01	29.95	114.76	2	49	19.0	574.7	8	0	32	30.50	113.56	4	47	31.4	552.8	
9	23	03	24.71	114.68	2	39	44.3	575.1	9	0	34	24.06	113.59	4	56	44.2	551.4	
10	23	05	19.39	114.61	2	30	09.2	575.6	10	0	36	17.65	113.62	5	05	55.6	550.1	
11	23	07	14.00	114.54	2	20	33.6	575.9	11	0	38	11.27	113.65	5	15	05.7	548.6	
12	23	09	08.54	114.47	2	10	57.7	576.1	12	0	40	04.92	113.68	5	24	14.3	547.2	
13	23	11	03.01	114.40	2	01	21.6	576.5	13	0	41	58.60	113.71	5	33	21.5	545.7	
14	23	12	57.41	114.33	1	51	45.1	576.7	14	0	43	52.31	113.76	5	42	27.2	544.2	
15	23	14	51.74	114.27	1	42	08.4	576.8	15	0	45	46.07	113.79	5	51	31.4	542.7	
16	23	16	46.01	114.22	1	32	31.6	577.1	16	0	47	39.86	113.83	6	00	34.1	541.0	
17	23	18	40.23	114.15	1	22	54.5	577.1	17	0	49	33.69	113.87	6	09	35.1	539.4	
18	23	20	34.38	114.10	1	13	17.4	577.2	18	0	51	27.56	113.91	6	18	34.5	537.8	
19	23	22	28.48	114.04	1	03	40.2	577.3	19	0	53	21.47	113.96	6	27	32.3	536.1	
20	23	24	22.52	113.99	0	54	02.9	577.2	20	0	55	15.43	114.01	6	36	28.4	534.3	
21	23	26	16.51	113.94	0	44	25.7	577.2	21	0	57	09.44	114.06	6	45	22.7	532.6	
22	23	28	10.45	113.90	0	34	48.5	577.2	22	0	59	03.50	114.11	6	54	15.3	530.8	
23	23	30	04.35	113.85	-0	25	11.3	+577.0	23	1	00	57.61	114.16	+	7	03	06.1	+528.9
SEPTEMBER 27									SEPTEMBER 29									
0	23	31	58.20	113.80	-0	15	34.3	+576.9	0	1	02	51.77	114.21	+	7	11	55.0	+527.1
1	23	33	52.00	113.77	-0	05	57.4	576.7	1	1	04	45.98	114.27	7	20	42.1	525.2	
2	23	35	45.77	113.73	+0	03	39.3	576.5	2	1	06	40.25	114.33	7	29	27.3	523.2	
3	23	37	39.50	113.69	0	13	15.8	576.2	3	1	08	34.58	114.39	7	38	10.5	521.3	
4	23	39	33.19	113.65	0	22	52.0	576.0	4	1	10	28.97	114.45	7	46	51.8	519.2	
5	23	41	26.84	113.63	0	32	28.0	575.6	5	1	12	23.42	114.52	7	55	31.0	517.3	
6	23	43	20.47	113.59	0	42	03.6	575.2	6	1	14	17.94	114.58	8	04	08.3	515.1	
7	23	45	14.06	113.57	0	51	38.8	574.8	7	1	16	12.52	114.64	8	12	43.4	513.1	
8	23	47	07.63	113.54	1	01	13.6	574.3	8	1	18	07.16	114.72	8	21	16.5	510.9	
9	23	49	01.17	113.52	1	10	47.9	573.9	9	1	20	01.88	114.78	8	29	47.4	508.8	
10	23	50	54.69	113.50	1	20	21.8	573.4	10	1	21	56.66	114.86	8	38	16.2	506.5	
11	23	52	48.19	113.48	1	29	55.2	572.9	11	1	23	51.52	114.93	8	46	42.7	504.3	
12	23	54	41.67	113.46	1	39	28.0	572.2	12	1	25	46.45	115.00	8	55	07.0	502.0	
13	23	56	35.13	113.44	1	49	00.2	571.6	13	1	27	41.45	115.09	9	03	29.0	499.8	
14	23	58	28.57	113.44	1	58	31.8	570.9	14	1	29	36.54	115.16	9	11	48.8	497.4	
15	0	00	22.01	113.42	2	08	02.7	570.2	15	1	31	31.70	115.24	9	20	06.2	495.0	
16	0	02	15.43	113.42	2	17	32.9	569.5	16	1	33	26.94	115.32	9	28	21.2	492.6	
17	0	04	08.85	113.41	2	27	02.4	568.7	17	1	35	22.26	115.40	9	36	33.8	490.1	
18	0	06	02.26	113.40	2	36	31.1	567.9	18	1	37	17.66	115.49	9	44	43.9	487.7	
19	0	07	55.66	113.40	2	45	59.0	567.0	19	1	39	13.15	115.58	9	52	51.6	485.2	
20	0	09	49.06	113.41	2	55	26.0	566.2	20	1	41	08.73	115.66	10	00	56.8	482.6	
21	0	11	42.47	113.40	3	04	52.2	565.2	21	1	43	04.39	115.75	10	08	59.4	480.1	
22	0	13	35.87	113.41	3	14	17.4	564.3	22	1	45	00.14	115.84	10	16	59.5	477.5	
23	0	15	29.28	113.42	3	23	41.7	+563.3	23	1	46	55.98	115.93	10	24	57.0	+474.8	
24	0	17	22.70		+3	33	05.0		24	1	48	51.91		+10	32	51.8		

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
SEPTEMBER 30									OCTOBER 2								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	1	48	51.91	116.03	+10	32	51.8	+472.1	0	3	23	47.89	121.77	+15	50	29.4	+306.5
1	1	50	47.94	116.12	10	40	43.9	469.5	1	3	25	49.66	121.91	15	55	35.9	302.4
2	1	52	44.06	116.22	10	48	33.4	466.7	2	3	27	51.57	122.05	16	00	38.3	298.1
3	1	54	40.28	116.31	10	56	20.1	463.9	3	3	29	53.62	122.16	16	05	36.4	293.9
4	1	56	36.59	116.41	11	04	04.0	461.2	4	3	31	55.80	122.33	16	10	30.3	289.6
5	1	58	33.00	116.52	11	11	45.2	458.2	5	3	33	58.13	122.46	16	15	19.9	285.3
6	2	00	29.52	116.61	11	19	23.4	455.5	6	3	36	00.59	122.60	16	20	05.2	280.9
7	2	02	26.13	116.72	11	26	58.9	452.5	7	3	38	03.19	122.73	16	24	46.1	276.6
8	2	04	22.85	116.82	11	34	31.4	449.6	8	3	40	05.92	122.88	16	29	22.7	272.3
9	2	06	19.67	116.92	11	42	01.0	446.6	9	3	42	08.80	123.01	16	33	55.0	267.7
10	2	08	16.59	117.03	11	49	27.6	443.6	10	3	44	11.81	123.15	16	38	22.7	263.4
11	2	10	13.62	117.14	11	56	51.2	440.6	11	3	46	14.96	123.30	16	42	46.1	258.9
12	2	12	10.76	117.25	12	04	11.8	437.5	12	3	48	18.26	123.43	16	47	05.0	254.4
13	2	14	08.01	117.36	12	11	29.3	434.5	13	3	50	21.69	123.57	16	51	19.4	249.8
14	2	16	05.37	117.47	12	18	43.8	431.3	14	3	52	25.26	123.71	16	55	29.2	245.3
15	2	18	02.84	117.58	12	25	55.1	428.1	15	3	54	28.97	123.84	16	59	34.5	240.8
16	2	20	00.42	117.70	12	33	03.2	425.0	16	3	56	32.81	123.99	17	03	35.3	236.1
17	2	21	58.12	117.81	12	40	08.2	421.7	17	3	58	36.80	124.13	17	07	31.4	231.5
18	2	23	55.93	117.92	12	47	09.9	418.5	18	4	00	40.93	124.26	17	11	22.9	226.9
19	2	25	53.85	118.04	12	54	08.4	415.2	19	4	02	45.19	124.40	17	15	09.8	222.1
20	2	27	51.89	118.16	13	01	03.6	411.9	20	4	04	49.59	124.54	17	18	51.9	217.5
21	2	29	50.05	118.28	13	07	55.5	408.5	21	4	06	54.13	124.68	17	22	29.4	212.7
22	2	31	48.33	118.40	13	14	44.0	405.2	22	4	08	58.81	124.82	17	26	02.1	208.0
23	2	33	46.73	118.51	+13	21	29.2	+401.7	23	4	11	03.63	124.95	+17	29	30.1	+203.1
OCTOBER 1									OCTOBER 3								
0	2	35	45.24	118.64	+13	28	10.9	+398.3	0	4	13	08.58	125.10	+17	32	53.2	+198.4
1	2	37	43.88	118.76	13	34	49.2	394.8	1	4	15	13.68	125.23	17	36	11.6	193.5
2	2	39	42.64	118.89	13	41	24.0	391.4	2	4	17	18.91	125.36	17	39	25.1	188.7
3	2	41	41.53	119.01	13	47	55.4	387.7	3	4	19	24.27	125.50	17	42	33.8	183.8
4	2	43	40.54	119.13	13	54	23.1	384.3	4	4	21	29.77	125.64	17	45	37.6	178.9
5	2	45	39.67	119.26	14	00	47.4	380.6	5	4	23	35.41	125.78	17	48	36.5	174.0
6	2	47	38.93	119.38	14	07	08.0	377.0	6	4	25	41.19	125.91	17	51	30.5	169.0
7	2	49	38.31	119.52	14	13	25.0	373.3	7	4	27	47.10	126.04	17	54	19.5	164.0
8	2	51	37.83	119.64	14	19	38.3	369.7	8	4	29	53.14	126.18	17	57	03.5	159.1
9	2	53	37.47	119.77	14	25	48.0	365.9	9	4	31	59.32	126.32	17	59	42.6	154.0
10	2	55	37.24	119.90	14	31	53.9	362.2	10	4	34	05.64	126.44	18	02	16.6	148.9
11	2	57	37.14	120.03	14	37	56.1	358.4	11	4	36	12.08	126.58	18	04	45.5	143.9
12	2	59	37.17	120.16	14	43	54.5	354.5	12	4	38	18.66	126.72	18	07	09.4	138.9
13	3	01	37.33	120.29	14	49	49.0	350.8	13	4	40	25.38	126.84	18	09	28.3	133.7
14	3	03	37.62	120.42	14	55	39.8	346.9	14	4	42	32.22	126.98	18	11	42.0	128.5
15	3	05	38.04	120.56	15	01	26.7	342.9	15	4	44	39.20	127.10	18	13	50.5	123.4
16	3	07	38.60	120.69	15	07	09.6	339.1	16	4	46	46.30	127.24	18	15	53.9	118.3
17	3	09	39.29	120.82	15	12	48.7	335.0	17	4	48	53.54	127.37	18	17	52.2	113.0
18	3	11	40.11	120.96	15	18	23.7	331.1	18	4	51	00.91	127.49	18	19	45.2	107.8
19	3	13	41.07	121.09	15	23	54.8	327.1	19	4	53	08.40	127.63	18	21	33.0	102.6
20	3	15	42.16	121.23	15	29	21.9	323.0	20	4	55	16.03	127.75	18	23	15.6	97.3
21	3	17	43.39	121.37	15	34	44.9	319.0	21	4	57	23.78	127.88	18	24	52.9	92.1
22	3	19	44.76	121.50	15	40	03.9	314.8	22	4	59	31.66	128.00	18	26	25.0	86.7
23	3	21	46.26	121.63	15	45	18.7	+310.7	23	5	01	39.66	128.13	18	27	51.7	+81.4
24	3	23	47.89		+15	50	29.4		24	5	03	47.79		+18	29	13.1	

UNIVERSAL TIME

Hour	Right Ascension			Declination			Hour	Right Ascension			Declination		
OCTOBER 4							OCTOBER 6						
0	h	m	s	°	'	"	0	h	m	s	°	'	"
0	5	03	47.79	+18	29	13.1	0	6	48	27.08	+17	45	09.6
1			128.25			+ 76.1	1			133.09			-195.8
1	5	05	56.04	18	30	29.2	1	6	50	40.17	17	41	53.8
2			128.38			70.8	2			133.17			201.7
2	5	08	04.42	18	31	40.0	2	6	52	53.34	17	38	32.1
3			128.50			65.3	3			133.23			207.6
3	5	10	12.92	18	32	45.3	3	6	55	06.57	17	35	04.5
4			128.62			60.0	4			133.32			213.3
4	5	12	21.54	18	33	45.3	4	6	57	19.89	17	31	31.2
5			128.75			54.5	5			133.38			219.2
5	5	14	30.29	18	34	39.8	5	6	59	33.27	17	27	52.0
6			128.86			49.1	6			133.46			225.0
6	5	16	39.15	18	35	28.9	6	7	01	46.73	17	24	07.0
7			128.98			43.7	7			133.53			230.9
7	5	18	48.13	18	36	12.6	7	7	04	00.26	17	20	16.1
8			129.11			38.2	8			133.59			236.6
8	5	20	57.24	18	36	50.8	8	7	06	13.85	17	16	19.5
9			129.22			32.8	9			133.67			242.5
9	5	23	06.46	18	37	23.6	9	7	08	27.52	17	12	17.0
10			129.33			27.2	10			133.73			248.3
10	5	25	15.79	18	37	50.8	10	7	10	41.25	17	08	08.7
11			129.45			21.8	11			133.80			254.1
11	5	27	25.24	18	38	12.6	11	7	12	55.05	17	03	54.6
12			129.57			16.2	12			133.87			259.9
12	5	29	34.81	18	38	28.8	12	7	15	08.92	16	59	34.7
13			129.68			10.7	13			133.93			265.8
13	5	31	44.49	18	38	39.5	13	7	17	22.85	16	55	08.9
14			129.80			+ 5.1	14			134.00			271.5
14	5	33	54.29	18	38	44.6	14	7	19	36.85	16	50	37.4
15			129.90			- 0.5	15			134.06			277.3
15	5	36	04.19	18	38	44.1	15	7	21	50.91	16	46	00.1
16			130.02			6.0	16			134.12			283.0
16	5	38	14.21	18	38	38.1	16	7	24	05.03	16	41	17.1
17			130.12			11.7	17			134.18			288.9
17	5	40	24.33	18	38	26.4	17	7	26	19.21	16	36	28.2
18			130.24			17.2	18			134.25			294.6
18	5	42	34.57	18	38	09.2	18	7	28	33.46	16	31	33.6
19			130.34			22.9	19			134.31			300.3
19	5	44	44.91	18	37	46.3	19	7	30	47.77	16	26	33.3
20			130.45			28.5	20			134.36			306.1
20	5	46	55.36	18	37	17.8	20	7	33	02.13	16	21	27.2
21			130.56			34.2	21			134.43			311.9
21	5	49	05.92	18	36	43.6	21	7	35	16.56	16	16	15.3
22			130.66			39.8	22			134.48			317.5
22	5	51	16.58	18	36	03.8	22	7	37	31.04	16	10	57.8
23			130.77			45.5	23			134.54			323.3
23	5	53	27.35	+18	35	18.3	23	7	39	45.58	+16	05	34.5
			130.86			- 51.2				134.60			-328.9
OCTOBER 5							OCTOBER 7						
0	h	m	s	°	'	"	0	h	m	s	°	'	"
0	5	55	38.21	+18	34	27.1	0	7	42	00.18	+16	00	05.6
1			130.97			- 56.9	1			134.66			-334.6
1	5	57	49.18	18	33	30.2	1	7	44	14.84	15	54	31.0
2			131.07			62.7	2			134.71			340.4
2	6	00	00.25	18	32	27.5	2	7	46	29.55	15	48	50.6
3			131.17			68.3	3			134.77			345.9
3	6	02	11.42	18	31	19.2	3	7	48	44.32	15	43	04.7
4			131.27			74.1	4			134.82			351.6
4	6	04	22.69	18	30	05.1	4	7	50	59.14	15	37	13.1
5			131.37			79.8	5			134.88			357.3
5	6	06	34.06	18	28	45.3	5	7	53	14.02	15	31	15.8
6			131.46			85.5	6			134.93			362.8
6	6	08	45.52	18	27	19.8	6	7	55	28.95	15	25	13.0
7			131.56			91.3	7			134.98			368.4
7	6	10	57.08	18	25	48.5	7	7	57	43.93	15	19	04.6
8			131.65			97.1	8			135.04			374.0
8	6	13	08.73	18	24	11.4	8	7	59	58.97	15	12	50.6
9			131.74			102.8	9			135.09			379.6
9	6	15	20.47	18	22	28.6	9	8	02	14.06	15	06	31.0
10			131.84			108.6	10			135.15			385.1
10	6	17	32.31	18	20	40.0	10	8	04	29.21	15	00	05.9
11			131.93			114.4	11			135.19			390.6
11	6	19	44.24	18	18	45.6	11	8	06	44.40	14	53	35.3
12			132.01			120.2	12			135.25			396.1
12	6	21	56.25	18	16	45.4	12	8	08	59.65	14	46	59.2
13			132.11			126.0	13			135.30			401.7
13	6	24	08.36	18	14	39.4	13	8	11	14.95	14	40	17.5
14			132.19			131.8	14			135.35			407.0
14	6	26	20.55	18	12	27.6	14	8	13	30.30	14	33	30.5
15			132.28			137.6	15			135.40			412.5
15	6	28	32.83	18	10	10.0	15	8	15	45.70	14	26	38.0
16			132.37			143.4	16			135.45			418.0
16	6	30	45.20	18	07	46.6	16	8	18	01.15	14	19	40.0
17			132.45			149.3	17			135.50			423.3
17	6	32	57.65	18	05	17.3	17	8	20	16.65	14	12	36.7
18			132.53			155.0	18			135.56			428.7
18	6	35	10.18	18	02	42.3	18	8	22	32.21	14	05	28.0
19			132.62			160.9	19			135.60			434.0
19	6	37	22.80	18	00	01.4	19	8	24	47.81	13	58	14.0
20			132.70			166.7	20			135.66			439.4
20	6	39	35.50	17	57	14.7	20	8	27	03.47	13	50	54.6
21			132.77			172.5	21			135.70			444.6
21	6	41	48.27	17	54	22.2	21	8	29	19.17	13	43	30.0
22			132.86			178.4	22			135.75			450.0
22	6	44	01.13	17	51	23.8	22	8	31	34.92	13	36	00.0
23			132.94			184.2	23			135.81			455.1
23	6	46	14.07	17	48	19.6	23	8	33	50.73	13	28	24.9
24			133.01			-190.0	24			135.85			-460.4
24	6	48	27.08	+17	45	09.6	24	8	36	06.58	+13	20	44.5

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
OCTOBER 8									OCTOBER 10								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	8	36	06.58	135.91	+13	20	44.5	-465.6	0	10	25	53.98	138.91	+5	42	26.5	-666.1
1	8	38	22.49	135.95	13	12	58.9	470.7	1	10	28	12.89	139.00	5	31	20.4	668.9
2	8	40	38.44	136.00	13	05	08.2	475.9	2	10	30	31.89	139.09	5	20	11.5	671.6
3	8	42	54.44	136.06	12	57	12.3	480.9	3	10	32	50.98	139.18	5	08	59.9	674.4
4	8	45	10.50	136.11	12	49	11.4	486.1	4	10	35	10.16	139.26	4	57	45.5	677.0
5	8	47	26.61	136.15	12	41	05.3	491.0	5	10	37	29.42	139.36	4	46	28.5	679.6
6	8	49	42.76	136.21	12	32	54.3	496.1	6	10	39	48.78	139.45	4	35	08.9	682.0
7	8	51	58.97	136.26	12	24	38.2	501.0	7	10	42	08.23	139.54	4	23	46.9	684.5
8	8	54	15.23	136.31	12	16	17.2	505.9	8	10	44	27.77	139.63	4	12	22.4	686.8
9	8	56	31.54	136.36	12	07	51.3	510.9	9	10	46	47.40	139.74	4	00	55.6	689.1
10	8	58	47.90	136.42	11	59	20.4	515.7	10	10	49	07.14	139.82	3	49	26.5	691.4
11	9	01	04.32	136.47	11	50	44.7	520.5	11	10	51	26.96	139.93	3	37	55.1	693.4
12	9	03	20.79	136.52	11	42	04.2	525.3	12	10	53	46.89	140.03	3	26	21.7	695.5
13	9	05	37.31	136.57	11	33	18.9	530.0	13	10	56	06.92	140.13	3	14	46.2	697.5
14	9	07	53.88	136.63	11	24	28.9	534.8	14	10	58	27.05	140.22	3	03	08.7	699.4
15	9	10	10.51	136.68	11	15	34.1	539.5	15	11	00	47.27	140.34	2	51	29.3	701.2
16	9	12	27.19	136.73	11	06	34.6	544.0	16	11	03	07.61	140.44	2	39	48.1	702.9
17	9	14	43.92	136.80	10	57	30.6	548.7	17	11	05	28.05	140.54	2	28	05.2	704.6
18	9	17	00.72	136.84	10	48	21.9	553.2	18	11	07	48.59	140.65	2	16	20.6	706.2
19	9	19	17.56	136.91	10	39	08.7	557.7	19	11	10	09.24	140.77	2	04	34.4	707.7
20	9	21	34.47	136.96	10	29	51.0	562.1	20	11	12	30.01	140.87	1	52	46.7	709.1
21	9	23	51.43	137.02	10	20	28.9	566.6	21	11	14	50.88	140.98	1	40	57.6	710.5
22	9	26	08.45	137.08	10	11	02.3	570.9	22	11	17	11.86	141.10	1	29	07.1	711.7
23	9	28	25.53	137.14	+10	01	31.4	-575.3	23	11	19	32.96	141.21	+1	17	15.4	-712.9
OCTOBER 9									OCTOBER 11								
0	9	30	42.67	137.19	+9	51	56.1	-579.5	0	11	21	54.17	141.33	+1	05	22.5	-714.0
1	9	32	59.86	137.26	9	42	16.6	583.8	1	11	24	15.50	141.44	0	53	28.5	715.0
2	9	35	17.12	137.32	9	32	32.8	588.0	2	11	26	36.94	141.56	0	41	33.5	715.9
3	9	37	34.44	137.38	9	22	44.8	592.0	3	11	28	58.50	141.69	0	29	37.6	716.7
4	9	39	51.82	137.44	9	12	52.8	596.2	4	11	31	20.19	141.80	0	17	40.9	717.5
5	9	42	09.26	137.51	9	02	56.6	600.2	5	11	33	41.99	141.92	+0	05	43.4	718.1
6	9	44	26.77	137.58	8	52	56.4	604.2	6	11	36	03.91	142.05	-0	06	14.7	718.7
7	9	46	44.35	137.63	8	42	52.2	608.1	7	11	38	25.96	142.17	0	18	13.4	719.2
8	9	49	01.98	137.71	8	32	44.1	611.9	8	11	40	48.13	142.30	0	30	12.6	719.6
9	9	51	19.69	137.77	8	22	32.2	615.8	9	11	43	10.43	142.42	0	42	12.2	719.9
10	9	53	37.46	137.85	8	12	16.4	619.6	10	11	45	32.85	142.56	0	54	12.1	720.1
11	9	55	55.31	137.91	8	01	56.8	623.3	11	11	47	55.41	142.68	1	06	12.2	720.2
12	9	58	13.22	137.98	7	51	33.5	626.9	12	11	50	18.09	142.81	1	18	12.4	720.3
13	10	00	31.20	138.05	7	41	06.6	630.5	13	11	52	40.90	142.94	1	30	12.7	720.2
14	10	02	49.25	138.13	7	30	36.1	634.0	14	11	55	03.84	143.08	1	42	12.9	720.1
15	10	05	07.38	138.20	7	20	02.1	637.6	15	11	57	26.92	143.20	1	54	13.0	719.8
16	10	07	25.58	138.28	7	09	24.5	640.9	16	11	59	50.12	143.35	2	06	12.8	719.5
17	10	09	43.86	138.35	6	58	43.6	644.3	17	12	02	13.47	143.47	2	18	12.3	719.1
18	10	12	02.21	138.43	6	47	59.3	647.6	18	12	04	36.94	143.62	2	30	11.4	718.5
19	10	14	20.64	138.50	6	37	11.7	650.9	19	12	07	00.56	143.75	2	42	09.9	717.9
20	10	16	39.14	138.59	6	26	20.8	654.0	20	12	09	24.31	143.89	2	54	07.8	717.3
21	10	18	57.73	138.67	6	15	26.8	657.1	21	12	11	48.20	144.03	3	06	05.1	716.4
22	10	21	16.40	138.75	6	04	29.7	660.1	22	12	14	12.23	144.17	3	18	01.5	715.5
23	10	23	35.15	138.83	5	53	29.6	-663.1	23	12	16	36.40	144.30	3	29	57.0	-714.5
24	10	25	53.98		+5	42	26.5		24	12	19	00.70		-3	41	51.5	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
OCTOBER 12									OCTOBER 14										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	12	19	00.70	144.45	-	3	41	51.5	-713.5	0	14	17	15.89	151.08	-12	22	57.3	-550.6	
1	12	21	25.15	144.60		3	53	45.0	712.2	1	14	19	46.97	151.19		12	32	07.9	545.1
2	12	23	49.75	144.73		4	05	37.2	711.0	2	14	22	18.16	151.29		12	41	13.0	539.5
3	12	26	14.48	144.88		4	17	28.2	709.6	3	14	24	49.45	151.39		12	50	12.5	533.7
4	12	28	39.36	145.02		4	29	17.8	708.2	4	14	27	20.84	151.50		12	59	06.2	528.1
5	12	31	04.38	145.17		4	41	06.0	706.6	5	14	29	52.34	151.60		13	07	54.3	522.2
6	12	33	29.55	145.31		4	52	52.6	704.9	6	14	32	23.94	151.68		13	16	36.5	516.3
7	12	35	54.86	145.45		5	04	37.5	703.1	7	14	34	55.62	151.79		13	25	12.8	510.3
8	12	38	20.31	145.60		5	16	20.6	701.4	8	14	37	27.41	151.87		13	33	43.1	504.3
9	12	40	45.91	145.75		5	28	02.0	699.3	9	14	39	59.28	151.95		13	42	07.4	498.2
10	12	43	11.66	145.89		5	39	41.3	697.3	10	14	42	31.23	152.05		13	50	25.6	492.0
11	12	45	37.55	146.05		5	51	18.6	695.2	11	14	45	03.28	152.12		13	58	37.6	485.8
12	12	48	03.60	146.18		6	02	53.8	692.9	12	14	47	35.40	152.20		14	06	43.4	479.5
13	12	50	29.78	146.34		6	14	26.7	690.6	13	14	50	07.60	152.27		14	14	42.9	473.2
14	12	52	56.12	146.48		6	25	57.3	688.2	14	14	52	39.87	152.35		14	22	36.1	466.7
15	12	55	22.60	146.63		6	37	25.5	685.6	15	14	55	12.22	152.41		14	30	22.8	460.3
16	12	57	49.23	146.77		6	48	51.1	683.0	16	14	57	44.63	152.47		14	38	03.1	453.7
17	13	00	16.00	146.93		7	00	14.1	680.3	17	15	00	17.10	152.54		14	45	36.8	447.1
18	13	02	42.93	147.07		7	11	34.4	677.5	18	15	02	49.64	152.59		14	53	03.9	440.5
19	13	05	10.00	147.21		7	22	51.9	674.5	19	15	05	22.23	152.65		15	00	24.4	433.8
20	13	07	37.21	147.36		7	34	06.4	671.6	20	15	07	54.88	152.69		15	07	38.2	427.0
21	13	10	04.57	147.51		7	45	18.0	668.5	21	15	10	27.57	152.74		15	14	45.2	420.3
22	13	12	32.08	147.66		7	56	26.5	665.2	22	15	13	00.31	152.79		15	21	45.5	413.4
23	13	14	59.74	147.80	-	8	07	31.7	-662.0	23	15	15	33.10	152.82	-	15	28	38.9	-406.4
OCTOBER 13									OCTOBER 15										
0	13	17	27.54	147.94	-	8	18	33.7	-658.6	0	15	18	05.92	152.85	-	15	35	25.3	-399.6
1	13	19	55.48	148.09		8	29	32.3	655.1	1	15	20	38.77	152.89		15	42	04.9	392.5
2	13	22	23.57	148.23		8	40	27.4	651.5	2	15	23	11.66	152.91		15	48	37.4	385.5
3	13	24	51.80	148.38		8	51	18.9	647.9	3	15	25	44.57	152.93		15	55	02.9	378.4
4	13	27	20.18	148.51		9	02	06.8	644.1	4	15	28	17.50	152.95		16	01	21.3	371.3
5	13	29	48.69	148.66		9	12	50.9	640.3	5	15	30	50.45	152.97		16	07	32.6	364.2
6	13	32	17.35	148.80		9	23	31.2	636.3	6	15	33	23.42	152.97		16	13	36.8	356.9
7	13	34	46.15	148.93		9	34	07.5	632.3	7	15	35	56.39	152.98		16	19	33.7	349.8
8	13	37	15.08	149.08		9	44	39.8	628.2	8	15	38	29.37	152.98		16	25	23.5	342.4
9	13	39	44.16	149.21		9	55	08.0	624.0	9	15	41	02.35	152.97		16	31	05.9	335.2
10	13	42	13.37	149.35		10	05	32.0	619.7	10	15	43	35.32	152.97		16	36	41.1	327.9
11	13	44	42.72	149.48		10	15	51.7	615.2	11	15	46	08.29	152.96		16	42	09.0	320.4
12	13	47	12.20	149.61		10	26	06.9	610.9	12	15	48	41.25	152.93		16	47	29.4	313.1
13	13	49	41.81	149.75		10	36	17.8	606.2	13	15	51	14.18	152.92		16	52	42.5	305.7
14	13	52	11.56	149.88		10	46	24.0	601.6	14	15	53	47.10	152.89		16	57	48.2	298.3
15	13	54	41.44	150.00		10	56	25.6	596.9	15	15	56	19.99	152.86		17	02	46.5	290.7
16	13	57	11.44	150.14		11	06	22.5	592.1	16	15	58	52.85	152.83		17	07	37.2	283.3
17	13	59	41.58	150.25		11	16	14.6	587.1	17	16	01	25.68	152.78		17	12	20.5	275.8
18	14	02	11.83	150.38		11	26	01.7	582.2	18	16	03	58.46	152.74		17	16	56.3	268.3
19	14	04	42.21	150.51		11	35	43.9	577.2	19	16	06	31.20	152.70		17	21	24.6	260.7
20	14	07	12.72	150.62		11	45	21.1	571.9	20	16	09	03.90	152.64		17	25	45.3	253.2
21	14	09	43.34	150.73		11	54	53.0	566.8	21	16	11	36.54	152.58		17	29	58.5	245.6
22	14	12	14.07	150.86		12	04	19.8	561.5	22	16	14	09.12	152.51		17	34	04.1	238.1
23	14	14	44.93	150.96		12	13	41.3	-556.0	23	16	16	41.63	152.45		17	38	02.2	-230.4
24	14	17	15.89		-	12	22	57.3		24	16	19	14.08		-	17	41	52.6	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
OCTOBER 16									OCTOBER 18								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	16	19	14.08		-17	41	52.6		0	18	18	25.73		-18	19	27.0	
1	16	21	46.46	152.38	17	45	35.4	-222.8	1	18	20	49.68	143.95	18	17	19.5	+127.5
2	16	24	18.76	152.30	17	49	10.6	215.2	2	18	23	13.36	143.68	18	15	05.4	134.1
3	16	26	50.98	152.22	17	52	38.2	207.6	3	18	25	36.78	143.42	18	12	44.8	140.6
4	16	29	23.12	152.14	17	55	58.1	199.9	4	18	27	59.95	143.17	18	10	17.8	147.0
5	16	31	55.16	152.04	17	59	10.5	192.4	5	18	30	22.84	142.89	18	07	44.4	153.4
6	16	34	27.11	151.95	18	02	15.2	184.7	6	18	32	45.47	142.63	18	05	04.6	159.8
7	16	36	58.96	151.85	18	05	12.2	177.0	7	18	35	07.83	142.36	18	02	18.5	166.1
8	16	39	30.70	151.74	18	08	01.7	169.5	8	18	37	29.92	142.09	17	59	26.1	172.4
9	16	42	02.34	151.64	18	10	43.5	161.8	9	18	39	51.74	141.82	17	56	27.6	178.5
10	16	44	33.86	151.52	18	13	17.7	154.2	10	18	42	13.28	141.54	17	53	22.8	184.8
11	16	47	05.26	151.40	18	15	44.2	146.5	11	18	44	34.55	141.27	17	50	12.0	190.8
12	16	49	36.54	151.28	18	18	03.2	139.0	12	18	46	55.54	140.99	17	46	55.0	197.0
13	16	52	07.69	151.15	18	20	14.5	131.3	13	18	49	16.26	140.72	17	43	32.1	202.9
14	16	54	38.71	151.02	18	22	18.2	123.7	14	18	51	36.69	140.43	17	40	03.1	209.0
15	16	57	09.59	150.88	18	24	14.4	116.2	15	18	53	56.84	140.15	17	36	28.3	214.8
16	16	59	40.34	150.75	18	26	02.9	108.5	16	18	56	16.71	139.87	17	32	47.5	220.8
17	17	02	10.93	150.59	18	27	43.9	101.0	17	18	58	36.30	139.59	17	29	01.0	226.5
18	17	04	41.38	150.45	18	29	17.4	93.5	18	19	00	55.60	139.30	17	25	08.7	232.3
19	17	07	11.67	150.29	18	30	43.3	85.9	19	19	03	14.62	139.02	17	21	10.6	238.1
20	17	09	41.81	150.14	18	32	01.7	78.4	20	19	05	33.36	138.74	17	17	06.9	243.7
21	17	12	11.78	149.97	18	33	12.6	70.9	21	19	07	51.80	138.44	17	12	57.6	249.3
22	17	14	41.59	149.81	18	34	16.0	63.4	22	19	10	09.96	138.16	17	08	42.7	254.9
23	17	17	11.23	149.64	-18	35	12.0	56.0	23	19	12	27.83	137.87	-17	04	22.3	260.4
			149.46					-48.5					137.58				+265.9
OCTOBER 17									OCTOBER 19								
0	17	19	40.69		-18	36	00.5		0	19	14	45.41		-16	59	56.4	
1	17	22	09.97	149.28	18	36	41.6	-41.1	1	19	17	02.71	137.30	16	55	25.1	+271.3
2	17	24	39.07	149.10	18	37	15.3	33.7	2	19	19	19.71	137.00	16	50	48.5	276.6
3	17	27	07.98	148.91	18	37	41.6	26.3	3	19	21	36.43	136.72	16	46	06.5	282.0
4	17	29	36.70	148.72	18	38	00.6	19.0	4	19	23	52.85	136.42	16	41	19.3	287.2
5	17	32	05.23	148.53	18	38	12.2	11.6	5	19	26	08.99	136.14	16	36	26.9	292.4
6	17	34	33.56	148.33	18	38	16.6	-4.4	6	19	28	24.83	135.84	16	31	29.4	297.5
7	17	37	01.69	148.13	18	38	13.7	+2.9	7	19	30	40.39	135.56	16	26	26.7	302.7
8	17	39	29.61	147.92	18	38	03.6	10.1	8	19	32	55.65	135.26	16	21	19.0	307.7
9	17	41	57.33	147.72	18	37	46.4	17.2	9	19	35	10.63	134.98	16	16	06.4	312.6
10	17	44	24.83	147.50	18	37	21.9	24.5	10	19	37	25.32	134.69	16	10	48.7	317.7
11	17	46	52.11	147.28	18	36	50.3	31.6	11	19	39	39.71	134.39	16	05	26.2	322.5
12	17	49	19.18	147.07	18	36	11.6	38.7	12	19	41	53.82	134.11	15	59	58.9	327.3
13	17	51	46.02	146.84	18	35	25.8	45.8	13	19	44	07.64	133.82	15	54	26.8	332.1
14	17	54	12.64	146.62	18	34	33.1	52.7	14	19	46	21.17	133.53	15	48	50.0	336.8
15	17	56	39.02	146.38	18	33	33.3	59.8	15	19	48	34.41	133.24	15	43	08.5	341.5
16	17	59	05.18	146.16	18	32	26.5	66.8	16	19	50	47.37	132.96	15	37	22.3	346.2
17	18	01	31.10	145.92	18	31	12.9	73.6	17	19	53	00.04	132.67	15	31	31.6	350.7
18	18	03	56.78	145.68	18	29	52.3	80.6	18	19	55	12.42	132.38	15	25	36.4	355.2
19	18	06	22.23	145.45	18	28	25.0	87.3	19	19	57	24.52	132.10	15	19	36.8	359.6
20	18	08	47.42	145.19	18	26	50.8	94.2	20	19	59	36.34	131.82	15	13	32.7	364.1
21	18	11	12.38	144.96	18	25	09.9	100.9	21	20	01	47.87	131.53	15	07	24.2	368.5
22	18	13	37.08	144.70	18	23	22.2	107.7	22	20	03	59.12	131.25	15	01	11.5	372.7
23	18	16	01.54	144.46	18	21	27.9	114.3	23	20	06	10.09	130.97	14	54	54.5	377.0
24	18	18	25.73	144.19	-18	19	27.0	+120.9	24	20	08	20.78	130.69	-14	48	33.3	+381.2

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
OCTOBER 20									OCTOBER 22								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	20	08	20.78	130.41	-14	48	33.3	+385.4	0	21	47	56.20	119.13	-8	37	22.7	+527.6
1	20	10	31.19	130.13	14	42	07.9	389.5	1	21	49	55.33	118.94	8	28	35.1	529.4
2	20	12	41.32	129.86	14	35	38.4	393.5	2	21	51	54.27	118.78	8	19	45.7	531.3
3	20	14	51.18	129.58	14	29	04.9	397.5	3	21	53	53.05	118.59	8	10	54.4	533.1
4	20	17	00.76	129.30	14	22	27.4	401.4	4	21	55	51.64	118.43	8	02	01.3	534.8
5	20	19	10.06	129.04	14	15	46.0	405.4	5	21	57	50.07	118.25	7	53	06.5	536.5
6	20	21	19.10	128.76	14	09	00.6	409.2	6	21	59	48.32	118.09	7	44	10.0	538.1
7	20	23	27.86	128.49	14	02	11.4	412.9	7	22	01	46.41	117.93	7	35	11.9	539.8
8	20	25	36.35	128.23	13	55	18.5	416.8	8	22	03	44.34	117.77	7	26	12.1	541.4
9	20	27	44.58	127.95	13	48	21.7	420.4	9	22	05	42.11	117.60	7	17	10.7	542.8
10	20	29	52.53	127.69	13	41	21.3	424.1	10	22	07	39.71	117.46	7	08	07.9	544.4
11	20	32	00.22	127.43	13	34	17.2	427.6	11	22	09	37.17	117.29	6	59	03.5	545.9
12	20	34	07.65	127.17	13	27	09.6	431.2	12	22	11	34.46	117.15	6	49	57.6	547.2
13	20	36	14.82	126.91	13	19	58.4	434.7	13	22	13	31.61	117.00	6	40	50.4	548.7
14	20	38	21.73	126.64	13	12	43.7	438.2	14	22	15	28.61	116.86	6	31	41.7	549.9
15	20	40	28.37	126.40	13	05	25.5	441.5	15	22	17	25.47	116.71	6	22	31.8	551.3
16	20	42	34.77	126.13	12	58	04.0	444.9	16	22	19	22.18	116.57	6	13	20.5	552.6
17	20	44	40.90	125.89	12	50	39.1	448.2	17	22	21	18.75	116.44	6	04	07.9	553.7
18	20	46	46.79	125.63	12	43	10.9	451.4	18	22	23	15.19	116.30	5	54	54.2	555.0
19	20	48	52.42	125.38	12	35	39.5	454.7	19	22	25	11.49	116.17	5	45	39.2	556.1
20	20	50	57.80	125.14	12	28	04.8	457.8	20	22	27	07.66	116.04	5	36	23.1	557.2
21	20	53	02.94	124.89	12	20	27.0	460.9	21	22	29	03.70	115.92	5	27	05.9	558.2
22	20	55	07.83	124.65	12	12	46.1	463.9	22	22	30	59.62	115.79	5	17	47.7	559.3
23	20	57	12.48	124.41	-12	05	02.2	+467.0	23	22	32	55.41	115.67	-5	08	28.4	+560.3
OCTOBER 21									OCTOBER 23								
0	20	59	16.89	124.17	-11	57	15.2	+470.0	0	22	34	51.08	115.55	-4	59	08.1	+561.3
1	21	01	21.06	123.93	11	49	25.2	472.8	1	22	36	46.63	115.44	4	49	46.8	562.2
2	21	03	24.99	123.70	11	41	32.4	475.8	2	22	38	42.07	115.32	4	40	24.6	563.0
3	21	05	28.69	123.46	11	33	36.6	478.5	3	22	40	37.39	115.21	4	31	01.6	563.9
4	21	07	32.15	123.23	11	25	38.1	481.4	4	22	42	32.60	115.11	4	21	37.7	564.8
5	21	09	35.38	123.01	11	17	36.7	484.0	5	22	44	27.71	115.00	4	12	12.9	565.4
6	21	11	38.39	122.78	11	09	32.7	486.8	6	22	46	22.71	114.90	4	02	47.5	566.3
7	21	13	41.17	122.56	11	01	25.9	489.4	7	22	48	17.61	114.79	3	53	21.2	566.9
8	21	15	43.73	122.34	10	53	16.5	492.0	8	22	50	12.40	114.71	3	43	54.3	567.5
9	21	17	46.07	122.11	10	45	04.5	494.6	9	22	52	07.11	114.60	3	34	26.8	568.2
10	21	19	48.18	121.90	10	36	49.9	497.0	10	22	54	01.71	114.52	3	24	58.6	568.8
11	21	21	50.08	121.69	10	28	32.9	499.5	11	22	55	56.23	114.42	3	15	29.8	569.4
12	21	23	51.77	121.48	10	20	13.4	502.0	12	22	57	50.65	114.34	3	06	00.4	569.8
13	21	25	53.25	121.26	10	11	51.4	504.3	13	22	59	44.99	114.26	2	56	30.6	570.3
14	21	27	54.51	121.06	10	03	27.1	506.7	14	23	01	39.25	114.18	2	47	00.3	570.8
15	21	29	55.57	120.86	9	55	00.4	508.9	15	23	03	33.43	114.09	2	37	29.5	571.2
16	21	31	56.43	120.65	9	46	31.5	511.2	16	23	05	27.52	114.03	2	27	58.3	571.5
17	21	33	57.08	120.45	9	38	00.3	513.4	17	23	07	21.55	113.94	2	18	26.8	571.9
18	21	35	57.53	120.26	9	29	26.9	515.5	18	23	09	15.49	113.88	2	08	54.9	572.1
19	21	37	57.79	120.06	9	20	51.4	517.7	19	23	11	09.37	113.81	1	59	22.8	572.5
20	21	39	57.85	119.87	9	12	13.7	519.7	20	23	13	03.18	113.75	1	49	50.3	572.6
21	21	41	57.72	119.68	9	03	34.0	521.8	21	23	14	56.93	113.68	1	40	17.7	572.9
22	21	43	57.40	119.49	8	54	52.2	523.8	22	23	16	50.61	113.62	1	30	44.8	573.0
23	21	45	56.89	119.31	8	46	08.4	+525.7	23	23	18	44.23	113.56	1	21	11.8	+573.1
24	21	47	56.20		-8	37	22.7		24	23	20	37.79		-1	11	38.7	

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination	Hour	Right Ascension				Declination
OCTOBER 24						OCTOBER 26					
	h	m	s	s	° ' " "		h	m	s	s	° ' " "
0	23	20	37.79	113.51	-1 11 38.7 +573.3	0	0	51	09.46	113.69	+ 6 17 49.9 +536.5
1	23	22	31.30	113.46	1 02 05.4 573.2	1	0	53	03.15	113.76	6 26 46.4 534.8
2	23	24	24.76	113.41	0 52 32.2 573.3	2	0	54	56.91	113.81	6 35 41.2 533.1
3	23	26	18.17	113.36	0 42 58.9 573.3	3	0	56	50.72	113.87	6 44 34.3 531.5
4	23	28	11.53	113.31	0 33 25.6 573.2	4	0	58	44.59	113.94	6 53 25.8 529.8
5	23	30	04.84	113.28	0 23 52.4 573.1	5	1	00	38.53	114.00	7 02 15.6 528.0
6	23	31	58.12	113.23	0 14 19.3 573.0	6	1	02	32.53	114.07	7 11 03.6 526.2
7	23	33	51.35	113.20	-0 04 46.3 572.8	7	1	04	26.60	114.14	7 19 49.8 524.4
8	23	35	44.55	113.16	+0 04 46.5 572.7	8	1	06	20.74	114.21	7 28 34.2 522.6
9	23	37	37.71	113.13	0 14 19.2 572.4	9	1	08	14.95	114.28	7 37 16.8 520.7
10	23	39	30.84	113.10	0 23 51.6 572.1	10	1	10	09.23	114.35	7 45 57.5 518.7
11	23	41	23.94	113.07	0 33 23.7 571.9	11	1	12	03.58	114.43	7 54 36.2 516.8
12	23	43	17.01	113.05	0 42 55.6 571.5	12	1	13	58.01	114.51	8 03 13.0 514.8
13	23	45	10.06	113.03	0 52 27.1 571.1	13	1	15	52.52	114.58	8 11 47.8 512.7
14	23	47	03.09	113.00	1 01 58.2 570.7	14	1	17	47.10	114.67	8 20 20.5 510.7
15	23	48	56.09	112.99	1 11 28.9 570.3	15	1	19	41.77	114.75	8 28 51.2 508.6
16	23	50	49.08	112.98	1 20 59.2 569.8	16	1	21	36.52	114.83	8 37 19.8 506.5
17	23	52	42.06	112.96	1 30 29.0 569.4	17	1	23	31.35	114.92	8 45 46.3 504.3
18	23	54	35.02	112.95	1 39 58.4 568.7	18	1	25	26.27	115.00	8 54 10.6 502.1
19	23	56	27.97	112.94	1 49 27.1 568.2	19	1	27	21.27	115.10	9 02 32.7 499.8
20	23	58	20.91	112.94	1 58 55.3 567.6	20	1	29	16.37	115.18	9 10 52.5 497.6
21	0	00	13.85	112.93	2 08 22.9 566.9	21	1	31	11.55	115.28	9 19 10.1 495.3
22	0	02	06.78	112.94	2 17 49.8 566.3	22	1	33	06.83	115.37	9 27 25.4 493.0
23	0	03	59.72	112.93	+2 27 16.1 +565.5	23	1	35	02.20	115.46	+ 9 35 38.4 +490.5
OCTOBER 25						OCTOBER 27					
0	0	05	52.65	112.94	+2 36 41.6 +564.8	0	1	36	57.66	115.56	+ 9 43 48.9 +488.2
1	0	07	45.59	112.95	2 46 06.4 564.0	1	1	38	53.22	115.66	9 51 57.1 485.7
2	0	09	38.54	112.96	2 55 30.4 563.2	2	1	40	48.88	115.76	10 00 02.8 483.2
3	0	11	31.50	112.96	3 04 53.6 562.3	3	1	42	44.64	115.86	10 08 06.0 480.8
4	0	13	24.46	112.98	3 14 15.9 561.4	4	1	44	40.50	115.96	10 16 06.8 478.1
5	0	15	17.44	112.99	3 23 37.3 560.5	5	1	46	36.46	116.06	10 24 04.9 475.6
6	0	17	10.43	113.02	3 32 57.8 559.6	6	1	48	32.52	116.17	10 32 00.5 473.0
7	0	19	03.45	113.03	3 42 17.4 558.6	7	1	50	28.69	116.27	10 39 53.5 470.3
8	0	20	56.48	113.05	3 51 36.0 557.5	8	1	52	24.96	116.38	10 47 43.8 467.7
9	0	22	49.53	113.08	4 00 53.5 556.5	9	1	54	21.34	116.49	10 55 31.5 464.9
10	0	24	42.61	113.10	4 10 10.0 555.4	10	1	56	17.83	116.60	11 03 16.4 462.1
11	0	26	35.71	113.14	4 19 25.4 554.2	11	1	58	14.43	116.70	11 10 58.5 459.4
12	0	28	28.85	113.16	4 28 39.6 553.1	12	2	00	11.13	116.82	11 18 37.9 456.6
13	0	30	22.01	113.20	4 37 52.7 551.9	13	2	02	07.95	116.94	11 26 14.5 453.7
14	0	32	15.21	113.23	4 47 04.6 550.6	14	2	04	04.89	117.04	11 33 48.2 450.8
15	0	34	08.44	113.27	4 56 15.2 549.4	15	2	06	01.93	117.16	11 41 19.0 447.9
16	0	36	01.71	113.31	5 05 24.6 548.1	16	2	07	59.09	117.28	11 48 46.9 444.9
17	0	37	55.02	113.35	5 14 32.7 546.8	17	2	09	56.37	117.40	11 56 11.8 441.9
18	0	39	48.37	113.39	5 23 39.5 545.3	18	2	11	53.77	117.51	12 03 33.7 438.9
19	0	41	41.76	113.44	5 32 44.8 544.0	19	2	13	51.28	117.63	12 10 52.6 435.8
20	0	43	35.20	113.49	5 41 48.8 542.5	20	2	15	48.91	117.75	12 18 08.4 432.8
21	0	45	28.69	113.54	5 50 51.3 541.1	21	2	17	46.66	117.87	12 25 21.2 429.6
22	0	47	22.23	113.58	5 59 52.4 539.5	22	2	19	44.53	118.00	12 32 30.8 426.4
23	0	49	15.81	113.65	6 08 51.9 +538.0	23	2	21	42.53	118.11	12 39 37.2 +423.3
24	0	51	09.46		+6 17 49.9	24	2	23	40.64		+12 46 40.5

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
OCTOBER 28									OCTOBER 30								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	2	23	40.64	118.24	+12	46	40.5	+420.0	0	4	00	43.17	124.52	+17	12	01.1	+227.6
1	2	25	38.88	118.36	12	53	40.5	416.8	1	4	02	47.69	124.64	17	15	48.7	222.9
2	2	27	37.24	118.49	13	00	37.3	413.4	2	4	04	52.33	124.76	17	19	31.6	218.1
3	2	29	35.73	118.62	13	07	30.7	410.2	3	4	06	57.09	124.89	17	23	09.7	213.4
4	2	31	34.35	118.74	13	14	20.9	406.7	4	4	09	01.98	125.02	17	26	43.1	208.6
5	2	33	33.09	118.86	13	21	07.6	403.4	5	4	11	07.00	125.13	17	30	11.7	203.8
6	2	35	31.95	119.00	13	27	51.0	399.9	6	4	13	12.13	125.26	17	33	35.5	199.0
7	2	37	30.95	119.12	13	34	30.9	396.5	7	4	15	17.39	125.38	17	36	54.5	194.0
8	2	39	30.07	119.25	13	41	07.4	393.0	8	4	17	22.77	125.50	17	40	08.5	189.2
9	2	41	29.32	119.38	13	47	40.4	389.4	9	4	19	28.27	125.62	17	43	17.7	184.3
10	2	43	28.70	119.51	13	54	09.8	385.9	10	4	21	33.89	125.74	17	46	22.0	179.4
11	2	45	28.21	119.64	14	00	35.7	382.3	11	4	23	39.63	125.85	17	49	21.4	174.4
12	2	47	27.85	119.77	14	06	58.0	378.6	12	4	25	45.48	125.97	17	52	15.8	169.4
13	2	49	27.62	119.90	14	13	16.6	375.0	13	4	27	51.45	126.09	17	55	05.2	164.4
14	2	51	27.52	120.04	14	19	31.6	371.3	14	4	29	57.54	126.20	17	57	49.6	159.4
15	2	53	27.56	120.16	14	25	42.9	367.6	15	4	32	03.74	126.31	18	00	29.0	154.3
16	2	55	27.72	120.30	14	31	50.5	363.8	16	4	34	10.05	126.43	18	03	03.3	149.3
17	2	57	28.02	120.43	14	37	54.3	360.0	17	4	36	16.48	126.54	18	05	32.6	144.2
18	2	59	28.45	120.56	14	43	54.3	356.2	18	4	38	23.02	126.64	18	07	56.8	139.1
19	3	01	29.01	120.70	14	49	50.5	352.4	19	4	40	29.66	126.76	18	10	15.9	134.0
20	3	03	29.71	120.83	14	55	42.9	348.4	20	4	42	36.42	126.86	18	12	29.9	128.8
21	3	05	30.54	120.96	15	01	31.3	344.6	21	4	44	43.28	126.98	18	14	38.7	123.7
22	3	07	31.50	121.10	15	07	15.9	340.6	22	4	46	50.26	127.07	18	16	42.4	118.5
23	3	09	32.60	121.23	+15	12	56.5	+336.6	23	4	48	57.33	127.18	+18	18	40.9	+113.3
OCTOBER 29									OCTOBER 31								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	3	11	33.83	121.36	+15	18	33.1	+332.6	0	4	51	04.51	127.29	+18	20	34.2	+108.0
1	3	13	35.19	121.50	15	24	05.7	328.6	1	4	53	11.80	127.39	18	22	22.2	102.9
2	3	15	36.69	121.63	15	29	34.3	324.5	2	4	55	19.19	127.48	18	24	05.1	97.5
3	3	17	38.32	121.76	15	34	58.8	320.4	3	4	57	26.67	127.59	18	25	42.6	92.4
4	3	19	40.08	121.90	15	40	19.2	316.3	4	4	59	34.26	127.69	18	27	15.0	87.0
5	3	21	41.98	122.03	15	45	35.5	312.1	5	5	01	41.95	127.78	18	28	42.0	81.7
6	3	23	44.01	122.17	15	50	47.6	307.9	6	5	03	49.73	127.88	18	30	03.7	76.4
7	3	25	46.18	122.30	15	55	55.5	303.7	7	5	05	57.61	127.97	18	31	20.1	71.1
8	3	27	48.48	122.43	16	00	59.2	299.5	8	5	08	05.58	128.06	18	32	31.2	65.7
9	3	29	50.91	122.56	16	05	58.7	295.2	9	5	10	13.64	128.16	18	33	36.9	60.3
10	3	31	53.47	122.70	16	10	53.9	290.8	10	5	12	21.80	128.25	18	34	37.2	55.0
11	3	33	56.17	122.83	16	15	44.7	286.6	11	5	14	30.05	128.34	18	35	32.2	49.6
12	3	35	59.00	122.97	16	20	31.3	282.1	12	5	16	38.39	128.42	18	36	21.8	44.2
13	3	38	01.97	123.09	16	25	13.4	277.8	13	5	18	46.81	128.51	18	37	06.0	38.7
14	3	40	05.06	123.23	16	29	51.2	273.3	14	5	20	55.32	128.59	18	37	44.7	33.3
15	3	42	08.29	123.36	16	34	24.5	268.9	15	5	23	03.91	128.68	18	38	18.0	27.9
16	3	44	11.65	123.48	16	38	53.4	264.4	16	5	25	12.59	128.76	18	38	45.9	22.4
17	3	46	15.13	123.62	16	43	17.8	259.9	17	5	27	21.35	128.85	18	39	08.3	17.0
18	3	48	18.75	123.75	16	47	37.7	255.4	18	5	29	30.20	128.92	18	39	25.3	11.5
19	3	50	22.50	123.88	16	51	53.1	250.8	19	5	31	39.12	129.00	18	39	36.8	6.0
20	3	52	26.38	124.01	16	56	03.9	246.3	20	5	33	48.11	129.08	18	39	42.8	+ 0.5
21	3	54	30.39	124.13	17	00	10.2	241.6	21	5	35	57.19	129.15	18	39	43.3	- 5.0
22	3	56	34.52	124.26	17	04	11.8	237.0	22	5	38	06.34	129.22	18	39	38.3	10.6
23	3	58	38.78	124.39	17	08	08.8	+232.3	23	5	40	15.56	129.30	18	39	27.7	- 16.0
24	4	00	43.17		+17	12	01.1		24	5	42	24.86		+18	39	11.7	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 1									NOVEMBER 3								
0	h	m	s	s	°	'	"	"	0	h	m	s	s	°	'	"	"
0	5	42	24.86		+18	39	11.7	-21.6	0	7	26	50.03		+16	36	56.1	-288.7
1			129.37					27.2	1			131.29					294.0
2	5	44	34.23	129.43				32.7	2	7	29	01.32	131.31				299.5
3	5	46	43.66	129.51				38.2	3	7	31	12.63	131.32				304.8
4	5	48	53.17	129.57				43.8	4	7	33	23.95	131.34				310.2
5	5	51	02.74	129.63				49.4	5	7	35	35.29	131.35				315.6
6	5	53	12.37	129.70				55.0	6	7	37	46.64	131.37				320.9
7	5	55	22.07	129.76				60.5	7	7	39	58.01	131.39				326.2
8	5	57	31.83	129.83				66.1	8	7	42	09.40	131.40				331.5
9	5	59	41.66	129.88				71.7	9	7	44	20.80	131.41				336.8
10	6	01	51.54	129.94				77.4	10	7	46	32.21	131.43				342.1
11	6	04	01.48	130.00				82.9	11	7	48	43.64	131.44				347.3
12	6	06	11.48	130.05				88.5	12	7	50	55.08	131.45				352.5
13	6	08	21.53	130.11				94.1	13	7	53	06.53	131.47				357.8
14	6	10	31.64	130.16				99.8	14	7	55	18.00	131.48				363.0
15	6	12	41.80	130.21				105.3	15	7	57	29.48	131.49				368.1
16	6	14	52.01	130.26				111.0	16	7	59	40.97	131.51				373.3
17	6	17	02.27	130.31				116.5	17	8	01	52.48	131.52				378.4
18	6	19	12.58	130.35				122.2	18	8	04	04.00	131.53				383.6
19	6	21	22.93	130.41				127.8	19	8	06	15.53	131.55				388.6
20	6	23	33.34	130.45				133.4	20	8	08	27.08	131.56				393.8
21	6	25	43.79	130.49				139.1	21	8	10	38.64	131.57				398.7
22	6	27	54.28	130.53				144.6	22	8	12	50.21	131.58				403.8
23	6	30	04.81	130.58				-150.2	23	8	15	01.79	131.61				-408.8
	6	32	15.39	130.61						8	17	13.40	131.61				
NOVEMBER 2									NOVEMBER 4								
0	6	34	26.00		+18	04	52.7	-155.9	0	8	19	25.01		+14	17	08.1	-413.8
1			130.66					161.5	1			131.63					418.7
2	6	36	36.66	130.69				167.0	2	8	21	36.64	131.64				423.7
3	6	38	47.35	130.73				172.7	3	8	23	48.28	131.66				428.6
4	6	40	58.08	130.76				178.3	4	8	25	59.94	131.67				433.4
5	6	43	08.84	130.80				183.8	5	8	28	11.61	131.69				438.3
6	6	45	19.64	130.83				189.4	6	8	30	23.30	131.71				443.2
7	6	47	30.47	130.87				195.0	7	8	32	35.01	131.72				447.9
8	6	49	41.34	130.89				200.6	8	8	34	46.73	131.75				452.7
9	6	51	52.23	130.93				206.2	9	8	36	58.48	131.76				457.5
10	6	54	03.16	130.95				211.7	10	8	39	10.24	131.77				462.1
11	6	56	14.11	130.98				217.3	11	8	41	22.01	131.80				466.9
12	6	58	25.09	131.01				222.8	12	8	43	33.81	131.82				471.5
13	7	00	36.10	131.04				228.3	13	8	45	45.63	131.84				476.2
14	7	02	47.14	131.06				233.9	14	8	47	57.47	131.86				480.8
15	7	04	58.20	131.09				239.4	15	8	50	09.33	131.88				485.3
16	7	07	09.29	131.11				244.9	16	8	52	21.21	131.91				489.9
17	7	09	20.40	131.13				250.5	17	8	54	33.12	131.93				494.3
18	7	11	31.53	131.15				255.9	18	8	56	45.05	131.95				498.9
19	7	13	42.68	131.18				261.4	19	8	58	57.00	131.99				503.3
20	7	15	53.86	131.19				266.8	20	9	01	08.99	132.00				507.7
21	7	18	05.05	131.22				272.3	21	9	03	20.99	132.04				512.0
22	7	20	16.27	131.24				277.8	22	9	05	33.03	132.07				516.5
23	7	22	27.51	131.25				-283.2	23	9	07	45.10	132.10				-520.7
24	7	24	38.76	131.27					24	9	09	57.20	132.12				
	7	26	50.03		+16	36	56.1			9	12	09.32		+11	09	44.2	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 5									NOVEMBER 7								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	9	12	09.32	132.16	+11	09	44.2	-525.0	0	10	58	58.45	135.68	+3	02	22.7	-677.6
1	9	14	21.48	132.20	11	00	59.2	529.2	1	11	01	14.13	135.80	2	51	05.1	679.4
2	9	16	33.68	132.23	10	52	10.0	533.4	2	11	03	29.93	135.92	2	39	45.7	681.3
3	9	18	45.91	132.26	10	43	16.6	537.6	3	11	05	45.85	136.05	2	28	24.4	682.9
4	9	20	58.17	132.31	10	34	19.0	541.7	4	11	08	01.90	136.18	2	17	01.5	684.6
5	9	23	10.48	132.34	10	25	17.3	545.8	5	11	10	18.08	136.31	2	05	36.9	686.1
6	9	25	22.82	132.38	10	16	11.5	549.9	6	11	12	34.39	136.44	1	54	10.8	687.7
7	9	27	35.20	132.43	10	07	01.6	553.8	7	11	14	50.83	136.58	1	42	43.1	689.0
8	9	29	47.63	132.47	9	57	47.8	557.9	8	11	17	07.41	136.72	1	31	14.1	690.5
9	9	32	00.10	132.51	9	48	29.9	561.7	9	11	19	24.13	136.86	1	19	43.6	691.7
10	9	34	12.61	132.56	9	39	08.2	565.7	10	11	21	40.99	137.00	1	08	11.9	693.0
11	9	36	25.17	132.60	9	29	42.5	569.4	11	11	23	57.99	137.15	0	56	38.9	694.1
12	9	38	37.77	132.66	9	20	13.1	573.3	12	11	26	15.14	137.29	0	45	04.8	695.2
13	9	40	50.43	132.71	9	10	39.8	577.1	13	11	28	32.43	137.45	0	33	29.6	696.3
14	9	43	03.14	132.76	9	01	02.7	580.8	14	11	30	49.88	137.59	0	21	53.3	697.1
15	9	45	15.90	132.81	8	51	21.9	584.5	15	11	33	07.47	137.75	+0	10	16.2	698.0
16	9	47	28.71	132.87	8	41	37.4	588.1	16	11	35	25.22	137.90	-0	01	21.8	698.9
17	9	49	41.58	132.92	8	31	49.3	591.7	17	11	37	43.12	138.06	0	13	00.7	699.5
18	9	51	54.50	132.99	8	21	57.6	595.2	18	11	40	01.18	138.23	0	24	40.2	700.1
19	9	54	07.49	133.05	8	12	02.4	598.7	19	11	42	19.41	138.38	0	36	20.3	700.7
20	9	56	20.54	133.11	8	02	03.7	602.2	20	11	44	37.79	138.55	0	48	01.0	701.2
21	9	58	33.65	133.17	7	52	01.5	605.6	21	11	46	56.34	138.71	0	59	42.2	701.6
22	10	00	46.82	133.24	7	41	55.9	609.0	22	11	49	15.05	138.88	1	11	23.8	701.9
23	10	03	00.06	133.31	+ 7	31	46.9	-612.2	23	11	51	33.93	139.06	-1	23	05.7	-702.2
NOVEMBER 6									NOVEMBER 8								
0	10	05	13.37	133.38	+ 7	21	34.7	-615.5	0	11	53	52.99	139.22	-1	34	47.9	-702.3
1	10	07	26.75	133.45	7	11	19.2	618.8	1	11	56	12.21	139.40	1	46	30.2	702.4
2	10	09	40.20	133.53	7	01	00.4	621.9	2	11	58	31.61	139.57	1	58	12.6	702.4
3	10	11	53.73	133.60	6	50	38.5	625.0	3	12	00	51.18	139.76	2	09	55.0	702.3
4	10	14	07.33	133.68	6	40	13.5	628.1	4	12	03	10.94	139.93	2	21	37.3	702.2
5	10	16	21.01	133.75	6	29	45.4	631.1	5	12	05	30.87	140.11	2	33	19.5	701.9
6	10	18	34.76	133.84	6	19	14.3	634.0	6	12	07	50.98	140.30	2	45	01.4	701.6
7	10	20	48.60	133.93	6	08	40.3	637.0	7	12	10	11.28	140.49	2	56	43.0	701.2
8	10	23	02.53	134.01	5	58	03.3	639.8	8	12	12	31.77	140.67	3	08	24.2	700.7
9	10	25	16.54	134.10	5	47	23.5	642.6	9	12	14	52.44	140.85	3	20	04.9	700.0
10	10	27	30.64	134.19	5	36	40.9	645.3	10	12	17	13.29	141.05	3	31	44.9	699.5
11	10	29	44.83	134.28	5	25	55.6	648.0	11	12	19	34.34	141.25	3	43	24.4	698.6
12	10	31	59.11	134.37	5	15	07.6	650.7	12	12	21	55.59	141.43	3	55	03.0	697.9
13	10	34	13.48	134.48	5	04	16.9	653.2	13	12	24	17.02	141.63	4	06	40.9	696.9
14	10	36	27.96	134.57	4	53	23.7	655.8	14	12	26	38.65	141.83	4	18	17.8	695.9
15	10	38	42.53	134.67	4	42	27.9	658.2	15	12	29	00.48	142.03	4	29	53.7	694.7
16	10	40	57.20	134.77	4	31	29.7	660.6	16	12	31	22.51	142.22	4	41	28.4	693.6
17	10	43	11.97	134.88	4	20	29.1	663.0	17	12	33	44.73	142.43	4	53	02.0	692.3
18	10	45	26.85	134.99	4	09	26.1	665.2	18	12	36	07.16	142.63	5	04	34.3	691.0
19	10	47	41.84	135.09	3	58	20.9	667.4	19	12	38	29.79	142.83	5	16	05.3	689.4
20	10	49	56.93	135.21	3	47	13.5	669.7	20	12	40	52.62	143.04	5	27	34.7	687.9
21	10	52	12.14	135.32	3	36	03.8	671.6	21	12	43	15.66	143.24	5	39	02.6	686.3
22	10	54	27.46	135.44	3	24	52.2	673.8	22	12	45	38.90	143.45	5	50	28.9	684.5
23	10	56	42.90	135.55	3	13	38.4	-675.7	23	12	48	02.35	143.66	6	01	53.4	-682.7
24	10	58	58.45		+ 3	02	22.7		24	12	50	26.01		-6	13	16.1	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
NOVEMBER 9									NOVEMBER 11										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	12	50	26.01	143.86	-	6	13	16.1	-680.8	0	14	49	27.46	153.46	-14	13	24.8	-480.9	
1	12	52	49.87	144.08		6	24	36.9	678.8	1	14	52	00.92	153.62		14	21	25.7	474.7
2	12	55	13.95	144.29		6	35	55.7	676.7	2	14	54	34.54	153.77		14	29	20.4	468.3
3	12	57	38.24	144.50		6	47	12.4	674.4	3	14	57	08.31	153.92		14	37	08.7	461.9
4	13	00	02.74	144.71		6	58	26.8	672.2	4	14	59	42.23	154.05		14	44	50.6	455.5
5	13	02	27.45	144.92		7	09	39.0	669.8	5	15	02	16.28	154.20		14	52	26.1	448.9
6	13	04	52.37	145.14		7	20	48.8	667.4	6	15	04	50.48	154.32		14	59	55.0	442.4
7	13	07	17.51	145.35		7	31	56.2	664.7	7	15	07	24.80	154.46		15	07	17.4	435.6
8	13	09	42.86	145.56		7	43	00.9	662.1	8	15	09	59.26	154.58		15	14	33.0	429.0
9	13	12	08.42	145.78		7	54	03.0	659.4	9	15	12	33.84	154.70		15	21	42.0	422.1
10	13	14	34.20	146.00		8	05	02.4	656.5	10	15	15	08.54	154.82		15	28	44.1	415.3
11	13	17	00.20	146.21		8	15	58.9	653.5	11	15	17	43.36	154.93		15	35	39.4	408.3
12	13	19	26.41	146.42		8	26	52.4	650.6	12	15	20	18.29	155.04		15	42	27.7	401.4
13	13	21	52.83	146.64		8	37	43.0	647.4	13	15	22	53.33	155.14		15	49	09.1	394.3
14	13	24	19.47	146.86		8	48	30.4	644.1	14	15	25	28.47	155.23		15	55	43.4	387.2
15	13	26	46.33	147.07		8	59	14.5	640.9	15	15	28	03.70	155.33		16	02	10.6	380.0
16	13	29	13.40	147.28		9	09	55.4	637.4	16	15	30	39.03	155.42		16	08	30.6	372.9
17	13	31	40.68	147.50		9	20	32.8	634.0	17	15	33	14.45	155.50		16	14	43.5	365.6
18	13	34	08.18	147.72		9	31	06.8	630.3	18	15	35	49.95	155.58		16	20	49.1	358.3
19	13	36	35.90	147.92		9	41	37.1	626.7	19	15	38	25.53	155.65		16	26	47.4	351.0
20	13	39	03.82	148.14		9	52	03.8	622.8	20	15	41	01.18	155.72		16	32	38.4	343.6
21	13	41	31.96	148.35		10	02	26.6	619.0	21	15	43	36.90	155.78		16	38	22.0	336.1
22	13	44	00.31	148.57		10	12	45.6	615.1	22	15	46	12.68	155.84		16	43	58.1	328.6
23	13	46	28.88	148.77		-10	23	00.7	-610.9	23	15	48	48.52	155.89		-16	49	26.7	-321.1
NOVEMBER 10									NOVEMBER 12										
0	13	48	57.65	148.99	-10	33	11.6	-606.8	0	15	51	24.41	155.93	-16	54	47.8	-313.5		
1	13	51	26.64	149.19		10	43	18.4	602.6	1	15	54	00.34	155.98		17	00	01.3	305.9
2	13	53	55.83	149.40		10	53	21.0	598.2	2	15	56	36.32	156.01		17	05	07.2	298.3
3	13	56	25.23	149.61		11	03	19.2	593.8	3	15	59	12.33	156.04		17	10	05.5	290.5
4	13	58	54.84	149.81		11	13	13.0	589.3	4	16	01	48.37	156.06		17	14	56.0	282.9
5	14	01	24.65	150.01		11	23	02.3	584.7	5	16	04	24.43	156.08		17	19	38.9	275.1
6	14	03	54.66	150.22		11	32	47.0	580.0	6	16	07	00.51	156.09		17	24	14.0	267.3
7	14	06	24.88	150.42		11	42	27.0	575.2	7	16	09	36.60	156.10		17	28	41.3	259.6
8	14	08	55.30	150.61		11	52	02.2	570.4	8	16	12	12.70	156.09		17	33	00.9	251.7
9	14	11	25.91	150.81		12	01	32.6	565.3	9	16	14	48.79	156.10		17	37	12.6	243.9
10	14	13	56.72	151.01		12	10	57.9	560.4	10	16	17	24.89	156.07		17	41	16.5	236.0
11	14	16	27.73	151.20		12	20	18.3	555.1	11	16	20	00.96	156.06		17	45	12.5	228.0
12	14	18	58.93	151.39		12	29	33.4	550.0	12	16	22	37.02	156.04		17	49	00.5	220.2
13	14	21	30.32	151.58		12	38	43.4	544.7	13	16	25	13.06	156.00		17	52	40.7	212.3
14	14	24	01.90	151.76		12	47	48.1	539.2	14	16	27	49.06	155.97		17	56	13.0	204.2
15	14	26	33.66	151.95		12	56	47.3	533.8	15	16	30	25.03	155.93		17	59	37.2	196.4
16	14	29	05.61	152.13		13	05	41.1	528.3	16	16	33	00.96	155.88		18	02	53.6	188.3
17	14	31	37.74	152.31		13	14	29.4	522.6	17	16	35	36.84	155.83		18	06	01.9	180.4
18	14	34	10.05	152.48		13	23	12.0	516.9	18	16	38	12.67	155.76		18	09	02.3	172.4
19	14	36	42.53	152.65		13	31	48.9	511.1	19	16	40	48.43	155.70		18	11	54.7	164.4
20	14	39	15.18	152.82		13	40	20.0	505.2	20	16	43	24.13	155.62		18	14	39.1	156.4
21	14	41	48.00	152.99		13	48	45.2	499.2	21	16	45	59.75	155.55		18	17	15.5	148.4
22	14	44	20.99	153.15		13	57	04.4	493.3	22	16	48	35.30	155.46		18	19	43.9	140.3
23	14	46	54.14	153.32		14	05	17.7	-487.1	23	16	51	10.76	155.37		18	22	04.2	-132.4
24	14	49	27.46			-14	13	24.8		24	16	53	46.13			-18	24	16.6	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 13									NOVEMBER 15								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	16	53	46.13	155.27	-18	24	16.6	-124.4	0	18	54	30.16	144.62	-17	39	54.3	+228.2
1	16	56	21.40	155.17	18	26	21.0	116.3	1	18	56	54.78	144.31	17	36	06.1	234.4
2	16	58	56.57	155.06	18	28	17.3	108.4	2	18	59	19.09	144.00	17	32	11.7	240.5
3	17	01	31.63	154.95	18	30	05.7	100.3	3	19	01	43.09	143.68	17	28	11.2	246.7
4	17	04	06.58	154.83	18	31	46.0	92.4	4	19	04	06.77	143.36	17	24	04.5	252.7
5	17	06	41.41	154.69	18	33	18.4	84.5	5	19	06	30.13	143.04	17	19	51.8	258.7
6	17	09	16.10	154.57	18	34	42.9	76.5	6	19	08	53.17	142.73	17	15	33.1	264.5
7	17	11	50.67	154.43	18	35	59.4	68.5	7	19	11	15.90	142.40	17	11	08.6	270.5
8	17	14	25.10	154.28	18	37	07.9	60.6	8	19	13	38.30	142.07	17	06	38.1	276.2
9	17	16	59.38	154.14	18	38	08.5	52.7	9	19	16	00.37	141.76	17	02	01.9	282.0
10	17	19	33.52	153.98	18	39	01.2	44.9	10	19	18	22.13	141.42	16	57	19.9	287.7
11	17	22	07.50	153.81	18	39	46.1	36.9	11	19	20	43.55	141.10	16	52	32.2	293.3
12	17	24	41.31	153.65	18	40	23.0	29.1	12	19	23	04.65	140.77	16	47	38.9	298.8
13	17	27	14.96	153.48	18	40	52.1	21.3	13	19	25	25.42	140.44	16	42	40.1	304.3
14	17	29	48.44	153.30	18	41	13.4	13.5	14	19	27	45.86	140.11	16	37	35.8	309.8
15	17	32	21.74	153.12	18	41	26.9	- 5.7	15	19	30	05.97	139.78	16	32	26.0	315.1
16	17	34	54.86	152.93	18	41	32.6	+ 2.1	16	19	32	25.75	139.45	16	27	10.9	320.4
17	17	37	27.79	152.74	18	41	30.5	9.7	17	19	34	45.20	139.12	16	21	50.5	325.7
18	17	40	00.53	152.53	18	41	20.8	17.5	18	19	37	04.32	138.79	16	16	24.8	330.8
19	17	42	33.06	152.34	18	41	03.3	25.1	19	19	39	23.11	138.46	16	10	54.0	336.0
20	17	45	05.40	152.12	18	40	38.2	32.7	20	19	41	41.57	138.12	16	05	18.0	341.0
21	17	47	37.52	151.91	18	40	05.5	40.3	21	19	43	59.69	137.79	15	59	37.0	346.0
22	17	50	09.43	151.70	18	39	25.2	47.8	22	19	46	17.48	137.46	15	53	51.0	350.9
23	17	52	41.13	151.46	-18	38	37.4	+ 55.4	23	19	48	34.94	137.13	-15	48	00.1	+355.8
NOVEMBER 14									NOVEMBER 16								
0	17	55	12.59	151.24	-18	37	42.0	+ 62.8	0	19	50	52.07	136.80	-15	42	04.3	+360.6
1	17	57	43.83	151.01	18	36	39.2	70.3	1	19	53	08.87	136.46	15	36	03.7	365.4
2	18	00	14.84	150.77	18	35	28.9	77.6	2	19	55	25.33	136.14	15	29	58.3	370.0
3	18	02	45.61	150.53	18	34	11.3	85.1	3	19	57	41.47	135.80	15	23	48.3	374.7
4	18	05	16.14	150.28	18	32	46.2	92.3	4	19	59	57.27	135.47	15	17	33.6	379.2
5	18	07	46.42	150.04	18	31	13.9	99.6	5	20	02	12.74	135.15	15	11	14.4	383.7
6	18	10	16.46	149.78	18	29	34.3	106.8	6	20	04	27.89	134.81	15	04	50.7	388.2
7	18	12	46.24	149.52	18	27	47.5	114.0	7	20	06	42.70	134.49	14	58	22.5	392.5
8	18	15	15.76	149.26	18	25	53.5	121.2	8	20	08	57.19	134.16	14	51	50.0	396.8
9	18	17	45.02	149.00	18	23	52.3	128.2	9	20	11	11.35	133.84	14	45	13.2	401.1
10	18	20	14.02	148.72	18	21	44.1	135.2	10	20	13	25.19	133.51	14	38	32.1	405.3
11	18	22	42.74	148.45	18	19	28.9	142.2	11	20	15	38.70	133.18	14	31	46.8	409.4
12	18	25	11.19	148.18	18	17	06.7	149.2	12	20	17	51.88	132.87	14	24	57.4	413.5
13	18	27	39.37	147.90	18	14	37.5	156.0	13	20	20	04.75	132.54	14	18	03.9	417.5
14	18	30	07.27	147.61	18	12	01.5	162.9	14	20	22	17.29	132.22	14	11	06.4	421.5
15	18	32	34.88	147.32	18	09	18.6	169.7	15	20	24	29.51	131.90	14	04	04.9	425.4
16	18	35	02.20	147.04	18	06	28.9	176.3	16	20	26	41.41	131.59	13	56	59.5	429.1
17	18	37	29.24	146.74	18	03	32.6	183.1	17	20	28	53.00	131.27	13	49	50.4	433.0
18	18	39	55.98	146.45	18	00	29.5	189.6	18	20	31	04.27	130.95	13	42	37.4	436.7
19	18	42	22.43	146.15	17	57	19.9	196.3	19	20	33	15.22	130.65	13	35	20.7	440.3
20	18	44	48.58	145.85	17	54	03.6	202.7	20	20	35	25.87	130.33	13	28	00.4	444.0
21	18	47	14.43	145.55	17	50	40.9	209.1	21	20	37	36.20	130.03	13	20	36.4	447.5
22	18	49	39.98	145.24	17	47	11.8	215.6	22	20	39	46.23	129.71	13	13	08.9	451.0
23	18	52	05.22	144.94	17	43	36.2	+221.9	23	20	41	55.94	129.41	13	05	37.9	+454.4
24	18	54	30.16		-17	39	54.3		24	20	44	05.35		-12	58	03.5	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 17									NOVEMBER 19								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	20	44	05.35	129.11	-12	58	03.5	+457.8	0	22	22	24.52	117.51	-6	04	19.4	+560.5
1	20	46	14.46	128.80	12	50	25.7	461.1	1	22	24	22.03	117.35	5	54	58.9	561.6
2	20	48	23.26	128.51	12	42	44.6	464.3	2	22	26	19.38	117.18	5	45	37.3	562.6
3	20	50	31.77	128.21	12	35	00.3	467.6	3	22	28	16.56	117.01	5	36	14.7	563.6
4	20	52	39.98	127.91	12	27	12.7	470.7	4	22	30	13.57	116.86	5	26	51.1	564.5
5	20	54	47.89	127.62	12	19	22.0	473.8	5	22	32	10.43	116.70	5	17	26.6	565.3
6	20	56	55.51	127.33	12	11	28.2	476.9	6	22	34	07.13	116.54	5	08	01.3	566.3
7	20	59	02.84	127.04	12	03	31.3	479.9	7	22	36	03.67	116.40	4	58	35.0	567.1
8	21	01	09.88	126.75	11	55	31.4	482.8	8	22	38	00.07	116.24	4	49	07.9	567.8
9	21	03	16.63	126.47	11	47	28.6	485.6	9	22	39	56.31	116.11	4	39	40.1	568.6
10	21	05	23.10	126.19	11	39	23.0	488.5	10	22	41	52.42	115.96	4	30	11.5	569.3
11	21	07	29.29	125.90	11	31	14.5	491.3	11	22	43	48.38	115.82	4	20	42.2	570.0
12	21	09	35.19	125.63	11	23	03.2	494.0	12	22	45	44.20	115.69	4	11	12.2	570.6
13	21	11	40.82	125.36	11	14	49.2	496.7	13	22	47	39.89	115.56	4	01	41.6	571.2
14	21	13	46.18	125.08	11	06	32.5	499.3	14	22	49	35.45	115.42	3	52	10.4	571.8
15	21	15	51.26	124.82	10	58	13.2	501.9	15	22	51	30.87	115.31	3	42	38.6	572.3
16	21	17	56.08	124.54	10	49	51.3	504.3	16	22	53	26.18	115.18	3	33	06.3	572.8
17	21	20	00.62	124.29	10	41	27.0	506.9	17	22	55	21.36	115.06	3	23	33.5	573.2
18	21	22	04.91	124.02	10	33	00.1	509.3	18	22	57	16.42	114.94	3	14	00.3	573.6
19	21	24	08.93	123.76	10	24	30.8	511.6	19	22	59	11.36	114.83	3	04	26.7	574.1
20	21	26	12.69	123.51	10	15	59.2	514.0	20	23	01	06.19	114.72	2	54	52.6	574.4
21	21	28	16.20	123.25	10	07	25.2	516.3	21	23	03	00.91	114.62	2	45	18.2	574.7
22	21	30	19.45	123.00	9	58	48.9	518.4	22	23	04	55.53	114.51	2	35	43.5	575.0
23	21	32	22.45	122.76	-9	50	10.5	+520.7	23	23	06	50.04	114.41	-2	26	08.5	+575.2
NOVEMBER 18									NOVEMBER 20								
0	21	34	25.21	122.51	-9	41	29.8	+522.8	0	23	08	44.45	114.31	-2	16	33.3	+575.4
1	21	36	27.72	122.26	9	32	47.0	524.8	1	23	10	38.76	114.22	2	06	57.9	575.7
2	21	38	29.98	122.03	9	24	02.2	526.9	2	23	12	32.98	114.13	1	57	22.2	575.7
3	21	40	32.01	121.79	9	15	15.3	528.9	3	23	14	27.11	114.04	1	47	46.5	575.9
4	21	42	33.80	121.56	9	06	26.4	530.9	4	23	16	21.15	113.95	1	38	10.6	575.9
5	21	44	35.36	121.32	8	57	35.5	532.7	5	23	18	15.10	113.88	1	28	34.7	576.0
6	21	46	36.68	121.10	8	48	42.8	534.6	6	23	20	08.98	113.79	1	18	58.7	576.0
7	21	48	37.78	120.88	8	39	48.2	536.4	7	23	22	02.77	113.72	1	09	22.7	575.9
8	21	50	38.66	120.65	8	30	51.8	538.1	8	23	23	56.49	113.64	0	59	46.8	575.9
9	21	52	39.31	120.43	8	21	53.7	539.9	9	23	25	50.13	113.58	0	50	10.9	575.8
10	21	54	39.74	120.22	8	12	53.8	541.5	10	23	27	43.71	113.50	0	40	35.1	575.7
11	21	56	39.96	120.00	8	03	52.3	543.2	11	23	29	37.21	113.45	0	30	59.4	575.5
12	21	58	39.96	119.80	7	54	49.1	544.8	12	23	31	30.66	113.38	0	21	23.9	575.3
13	22	00	39.76	119.58	7	45	44.3	546.3	13	23	33	24.04	113.33	0	11	48.6	575.1
14	22	02	39.34	119.39	7	36	38.0	547.8	14	23	35	17.37	113.27	-0	02	13.5	574.9
15	22	04	38.73	119.18	7	27	30.2	549.2	15	23	37	10.64	113.22	+0	07	21.4	574.5
16	22	06	37.91	118.98	7	18	21.0	550.7	16	23	39	03.86	113.17	0	16	55.9	574.3
17	22	08	36.89	118.79	7	09	10.3	552.0	17	23	40	57.03	113.12	0	26	30.2	573.8
18	22	10	35.68	118.60	6	59	58.3	553.4	18	23	42	50.15	113.09	0	36	04.0	573.5
19	22	12	34.28	118.41	6	50	44.9	554.7	19	23	44	43.24	113.04	0	45	37.5	573.1
20	22	14	32.69	118.23	6	41	30.2	555.9	20	23	46	36.28	113.00	0	55	10.6	572.6
21	22	16	30.92	118.04	6	32	14.3	557.2	21	23	48	29.28	112.97	1	04	43.2	572.1
22	22	18	28.96	117.87	6	22	57.1	558.3	22	23	50	22.25	112.94	1	14	15.3	571.6
23	22	20	26.83	117.69	6	13	38.8	+559.4	23	23	52	15.19	112.91	1	23	46.9	+571.1
24	22	22	24.52		-6	04	19.4		24	23	54	08.10		+1	33	18.0	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 21									NOVEMBER 23								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	23	54	08.10	112.89	+1	33	18.0	+570.4	0	1	24	47.35	114.73	+8	48	54.5	+504.8
1	23	56	00.99	112.86	1	42	48.4	569.9	1	1	26	42.08	114.83	8	57	19.3	502.7
2	23	57	53.85	112.84	1	52	18.3	569.2	2	1	28	36.91	114.93	9	05	42.0	500.4
3	23	59	46.69	112.83	2	01	47.5	568.5	3	1	30	31.84	115.02	9	14	02.4	498.2
4	0	01	39.52	112.81	2	11	16.0	567.8	4	1	32	26.86	115.12	9	22	20.6	495.9
5	0	03	32.33	112.80	2	20	43.8	567.1	5	1	34	21.98	115.23	9	30	36.5	493.7
6	0	05	25.13	112.80	2	30	10.9	566.3	6	1	36	17.21	115.33	9	38	50.2	491.3
7	0	07	17.93	112.78	2	39	37.2	565.5	7	1	38	12.54	115.44	9	47	01.5	488.9
8	0	09	10.71	112.79	2	49	02.7	564.7	8	1	40	07.98	115.54	9	55	10.4	486.6
9	0	11	03.50	112.78	2	58	27.4	563.8	9	1	42	03.52	115.65	10	03	17.0	484.1
10	0	12	56.28	112.78	3	07	51.2	562.9	10	1	43	59.17	115.76	10	11	21.1	481.6
11	0	14	49.06	112.80	3	17	14.1	561.9	11	1	45	54.93	115.88	10	19	22.7	479.1
12	0	16	41.86	112.79	3	26	36.0	561.0	12	1	47	50.81	115.99	10	27	21.8	476.6
13	0	18	34.65	112.81	3	35	57.0	560.0	13	1	49	46.80	116.11	10	35	18.4	474.0
14	0	20	27.46	112.83	3	45	17.0	559.0	14	1	51	42.91	116.22	10	43	12.4	471.4
15	0	22	20.29	112.84	3	54	36.0	557.9	15	1	53	39.13	116.34	10	51	03.8	468.8
16	0	24	13.13	112.85	4	03	53.9	556.8	16	1	55	35.47	116.46	10	58	52.6	466.1
17	0	26	05.98	112.88	4	13	10.7	555.7	17	1	57	31.93	116.59	11	06	38.7	463.4
18	0	27	58.86	112.91	4	22	26.4	554.5	18	1	59	28.52	116.70	11	14	22.1	460.7
19	0	29	51.77	112.92	4	31	40.9	553.4	19	2	01	25.22	116.84	11	22	02.8	457.8
20	0	31	44.69	112.96	4	40	54.3	552.1	20	2	03	22.06	116.95	11	29	40.6	455.1
21	0	33	37.65	112.99	4	50	06.4	550.9	21	2	05	19.01	117.09	11	37	15.7	452.2
22	0	35	30.64	113.03	4	59	17.3	549.5	22	2	07	16.10	117.21	11	44	47.9	449.3
23	0	37	23.67	113.06	+5	08	26.8	+548.3	23	2	09	13.31	117.35	+11	52	17.2	+446.4
NOVEMBER 22									NOVEMBER 24								
0	0	39	16.73	113.10	+5	17	35.1	+546.9	0	2	11	10.66	117.47	+11	59	43.6	+443.5
1	0	41	09.83	113.14	5	26	42.0	545.6	1	2	13	08.13	117.61	12	07	07.1	440.4
2	0	43	02.97	113.18	5	35	47.6	544.1	2	2	15	05.74	117.74	12	14	27.5	437.5
3	0	44	56.15	113.23	5	44	51.7	542.7	3	2	17	03.48	117.88	12	21	45.0	434.4
4	0	46	49.38	113.28	5	53	54.4	541.2	4	2	19	01.36	118.01	12	28	59.4	431.3
5	0	48	42.66	113.33	6	02	55.6	539.7	5	2	20	59.37	118.15	12	36	10.7	428.2
6	0	50	35.99	113.39	6	11	55.3	538.2	6	2	22	57.52	118.29	12	43	18.9	425.0
7	0	52	29.38	113.44	6	20	53.5	536.5	7	2	24	55.81	118.43	12	50	23.9	421.8
8	0	54	22.82	113.50	6	29	50.0	535.0	8	2	26	54.24	118.56	12	57	25.7	418.6
9	0	56	16.32	113.56	6	38	45.0	533.3	9	2	28	52.80	118.71	13	04	24.3	415.4
10	0	58	09.88	113.62	6	47	38.3	531.7	10	2	30	51.51	118.85	13	11	19.7	412.0
11	1	00	03.50	113.69	6	56	30.0	530.0	11	2	32	50.36	118.99	13	18	11.7	408.8
12	1	01	57.19	113.76	7	05	20.0	528.2	12	2	34	49.35	119.14	13	25	00.5	405.3
13	1	03	50.95	113.83	7	14	08.2	526.4	13	2	36	48.49	119.27	13	31	45.8	402.0
14	1	05	44.78	113.89	7	22	54.6	524.7	14	2	38	47.76	119.43	13	38	27.8	398.5
15	1	07	38.67	113.98	7	31	39.3	522.8	15	2	40	47.19	119.57	13	45	06.3	395.1
16	1	09	32.65	114.04	7	40	22.1	520.9	16	2	42	46.76	119.72	13	51	41.4	391.5
17	1	11	26.69	114.13	7	49	03.0	519.1	17	2	44	46.48	119.86	13	58	12.9	388.0
18	1	13	20.82	114.21	7	57	42.1	517.1	18	2	46	46.34	120.01	14	04	40.9	384.5
19	1	15	15.03	114.29	8	06	19.2	515.1	19	2	48	46.35	120.16	14	11	05.4	380.8
20	1	17	09.32	114.37	8	14	54.3	513.1	20	2	50	46.51	120.31	14	17	26.2	377.2
21	1	19	03.69	114.47	8	23	27.4	511.1	21	2	52	46.82	120.46	14	23	43.4	373.6
22	1	20	58.16	114.55	8	31	58.5	509.1	22	2	54	47.28	120.61	14	29	57.0	369.8
23	1	22	52.71	114.64	8	40	27.6	+506.9	23	2	56	47.89	120.75	14	36	06.8	+366.1
24	1	24	47.35		+8	48	54.5		24	2	58	48.64		+14	42	12.9	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 25									NOVEMBER 27								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	2	58	48.64	120.91	+14	42	12.9	+362.3	0	4	38	18.67	127.72	+18	11	12.7	+144.4
1	3	00	49.55	121.06	14	48	15.2	358.5	1	4	40	26.39	127.85	18	13	37.1	139.1
2	3	02	50.61	121.21	14	54	13.7	354.6	2	4	42	34.24	127.96	18	15	56.2	133.9
3	3	04	51.82	121.36	15	00	08.3	350.8	3	4	44	42.20	128.08	18	18	10.1	128.6
4	3	06	53.18	121.51	15	05	59.1	346.8	4	4	46	50.28	128.18	18	20	18.7	123.4
5	3	08	54.69	121.66	15	11	45.9	343.0	5	4	48	58.46	128.30	18	22	22.1	118.1
6	3	10	56.35	121.81	15	17	28.9	338.9	6	4	51	06.76	128.41	18	24	20.2	112.7
7	3	12	58.16	121.97	15	23	07.8	334.9	7	4	53	15.17	128.52	18	26	12.9	107.5
8	3	15	00.13	122.12	15	28	42.7	330.9	8	4	55	23.69	128.62	18	28	00.4	102.1
9	3	17	02.25	122.26	15	34	13.6	326.9	9	4	57	32.31	128.72	18	29	42.5	96.7
10	3	19	04.51	122.42	15	39	40.5	322.7	10	4	59	41.03	128.83	18	31	19.2	91.4
11	3	21	06.93	122.58	15	45	03.2	318.5	11	5	01	49.86	128.93	18	32	50.6	85.9
12	3	23	09.51	122.72	15	50	21.7	314.4	12	5	03	58.79	129.03	18	34	16.5	80.6
13	3	25	12.23	122.87	15	55	36.1	310.2	13	5	06	07.82	129.12	18	35	37.1	75.1
14	3	27	15.10	123.03	16	00	46.3	306.0	14	5	08	16.94	129.22	18	36	52.2	69.6
15	3	29	18.13	123.18	16	05	52.3	301.6	15	5	10	26.16	129.32	18	38	01.8	64.2
16	3	31	21.31	123.32	16	10	53.9	297.4	16	5	12	35.48	129.40	18	39	06.0	58.7
17	3	33	24.63	123.48	16	15	51.3	293.1	17	5	14	44.88	129.49	18	40	04.7	53.2
18	3	35	28.11	123.62	16	20	44.4	288.6	18	5	16	54.37	129.58	18	40	57.9	47.8
19	3	37	31.73	123.78	16	25	33.0	284.3	19	5	19	03.95	129.67	18	41	45.7	42.1
20	3	39	35.51	123.92	16	30	17.3	279.9	20	5	21	13.62	129.75	18	42	27.8	36.7
21	3	41	39.43	124.07	16	34	57.2	275.4	21	5	23	23.37	129.83	18	43	04.5	31.1
22	3	43	43.50	124.22	16	39	32.6	270.9	22	5	25	33.20	129.91	18	43	35.6	25.5
23	3	45	47.72	124.37	+16	44	03.5	+266.3	23	5	27	43.11	129.99	+18	44	01.1	+20.0
NOVEMBER 26									NOVEMBER 28								
0	3	47	52.09	124.51	+16	48	29.8	+261.9	0	5	29	53.10	130.06	+18	44	21.1	+14.4
1	3	49	56.60	124.66	16	52	51.7	257.2	1	5	32	03.16	130.13	18	44	35.5	8.8
2	3	52	01.26	124.80	16	57	08.9	252.6	2	5	34	13.29	130.21	18	44	44.3	+3.2
3	3	54	06.06	124.95	17	01	21.5	248.0	3	5	36	23.50	130.28	18	44	47.5	-2.4
4	3	56	11.01	125.09	17	05	29.5	243.4	4	5	38	33.78	130.34	18	44	45.1	8.1
5	3	58	16.10	125.23	17	09	32.9	238.6	5	5	40	44.12	130.41	18	44	37.0	13.6
6	4	00	21.33	125.37	17	13	31.5	233.9	6	5	42	54.53	130.47	18	44	23.4	19.3
7	4	02	26.70	125.52	17	17	25.4	229.1	7	5	45	05.00	130.53	18	44	04.1	25.0
8	4	04	32.22	125.65	17	21	14.5	224.4	8	5	47	15.53	130.59	18	43	39.1	30.6
9	4	06	37.87	125.79	17	24	58.9	219.6	9	5	49	26.12	130.65	18	43	08.5	36.2
10	4	08	43.66	125.93	17	28	38.5	214.7	10	5	51	36.77	130.70	18	42	32.3	41.9
11	4	10	49.59	126.07	17	32	13.2	209.9	11	5	53	47.47	130.75	18	41	50.4	47.6
12	4	12	55.66	126.20	17	35	43.1	204.9	12	5	55	58.22	130.81	18	41	02.8	53.3
13	4	15	01.86	126.34	17	39	08.0	200.1	13	5	58	09.03	130.85	18	40	09.5	58.9
14	4	17	08.20	126.47	17	42	28.1	195.1	14	6	00	19.88	130.90	18	39	10.6	64.6
15	4	19	14.67	126.60	17	45	43.2	190.2	15	6	02	30.78	130.94	18	38	06.0	70.3
16	4	21	21.27	126.73	17	48	53.4	185.1	16	6	04	41.72	130.99	18	36	55.7	75.9
17	4	23	28.00	126.86	17	51	58.5	180.2	17	6	06	52.71	131.02	18	35	39.8	81.7
18	4	25	34.86	126.99	17	54	58.7	175.1	18	6	09	03.73	131.06	18	34	18.1	87.3
19	4	27	41.85	127.12	17	57	53.8	170.0	19	6	11	14.79	131.10	18	32	50.8	93.0
20	4	29	48.97	127.24	18	00	43.8	164.9	20	6	13	25.89	131.14	18	31	17.8	98.7
21	4	31	56.21	127.36	18	03	28.7	159.8	21	6	15	37.03	131.16	18	29	39.1	104.4
22	4	34	03.57	127.49	18	06	08.5	154.7	22	6	17	48.19	131.20	18	27	54.7	110.1
23	4	36	11.06	127.61	18	08	43.2	+149.5	23	6	19	59.39	131.22	18	26	04.6	-115.8
24	4	38	18.67		+18	11	12.7		24	6	22	10.61		+18	24	08.8	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
NOVEMBER 29									DECEMBER 1								
	h	m	s		°	'	"			h	m	s		°	'	"	
0	6	22	10.61	131.25	+18	24	08.8	-121.4	0	8	07	09.80	130.73	+15	03	05.2	-380.5
1	6	24	21.86	131.28	18	22	07.4	127.1	1	8	09	20.53	130.70	14	56	44.7	385.5
2	6	26	33.14	131.29	18	20	00.3	132.8	2	8	11	31.23	130.67	14	50	19.2	390.4
3	6	28	44.43	131.32	18	17	47.5	138.4	3	8	13	41.90	130.64	14	43	48.8	395.3
4	6	30	55.75	131.33	18	15	29.1	144.1	4	8	15	52.54	130.60	14	37	13.5	400.0
5	6	33	07.08	131.36	18	13	05.0	149.8	5	8	18	03.14	130.57	14	30	33.5	404.9
6	6	35	18.44	131.36	18	10	35.2	155.4	6	8	20	13.71	130.53	14	23	48.6	409.6
7	6	37	29.80	131.38	18	07	59.8	161.1	7	8	22	24.24	130.51	14	16	59.0	414.4
8	6	39	41.18	131.39	18	05	18.7	166.7	8	8	24	34.75	130.47	14	10	04.6	419.1
9	6	41	52.57	131.40	18	02	32.0	172.3	9	8	26	45.22	130.43	14	03	05.5	423.8
10	6	44	03.97	131.41	17	59	39.7	178.0	10	8	28	55.65	130.41	13	56	01.7	428.5
11	6	46	15.38	131.41	17	56	41.7	183.6	11	8	31	06.06	130.37	13	48	53.2	433.1
12	6	48	26.79	131.42	17	53	38.1	189.2	12	8	33	16.43	130.34	13	41	40.1	437.6
13	6	50	38.21	131.42	17	50	28.9	194.7	13	8	35	26.77	130.31	13	34	22.5	442.3
14	6	52	49.63	131.42	17	47	14.2	200.4	14	8	37	37.08	130.28	13	27	00.2	446.7
15	6	55	01.05	131.42	17	43	53.8	205.9	15	8	39	47.36	130.24	13	19	33.5	451.3
16	6	57	12.47	131.42	17	40	27.9	211.5	16	8	41	57.60	130.22	13	12	02.2	455.7
17	6	59	23.89	131.42	17	36	56.4	217.1	17	8	44	07.82	130.19	13	04	26.5	460.2
18	7	01	35.31	131.41	17	33	19.3	222.6	18	8	46	18.01	130.15	12	56	46.3	464.5
19	7	03	46.72	131.40	17	29	36.7	228.1	19	8	48	28.16	130.13	12	49	01.8	468.9
20	7	05	58.12	131.39	17	25	48.6	233.6	20	8	50	38.29	130.11	12	41	12.9	473.3
21	7	08	09.51	131.39	17	21	55.0	239.2	21	8	52	48.40	130.07	12	33	19.6	477.5
22	7	10	20.90	131.37	17	17	55.8	244.6	22	8	54	58.47	130.05	12	25	22.1	481.8
23	7	12	32.27	131.36	+17	13	51.2	-250.1	23	8	57	08.52	130.02	+12	17	20.3	-486.1
NOVEMBER 30									DECEMBER 2								
	h	m	s		°	'	"			h	m	s		°	'	"	
0	7	14	43.63	131.35	+17	09	41.1	-255.5	0	8	59	18.54	130.00	+12	09	14.2	-490.2
1	7	16	54.98	131.33	17	05	25.6	261.0	1	9	01	28.54	129.97	12	01	04.0	494.3
2	7	19	06.31	131.32	17	01	04.6	266.4	2	9	03	38.51	129.95	11	52	49.7	498.5
3	7	21	17.63	131.30	16	56	38.2	271.8	3	9	05	48.46	129.93	11	44	31.2	502.6
4	7	23	28.93	131.28	16	52	06.4	277.2	4	9	07	58.39	129.91	11	36	08.6	506.6
5	7	25	40.21	131.26	16	47	29.2	282.6	5	9	10	08.30	129.88	11	27	42.0	510.6
6	7	27	51.47	131.24	16	42	46.6	287.9	6	9	12	18.18	129.87	11	19	11.4	514.6
7	7	30	02.71	131.22	16	37	58.7	293.3	7	9	14	28.05	129.85	11	10	36.8	518.5
8	7	32	13.93	131.19	16	33	05.4	298.5	8	9	16	37.90	129.84	11	01	58.3	522.5
9	7	34	25.12	131.17	16	28	06.9	303.9	9	9	18	47.74	129.82	10	53	15.8	526.2
10	7	36	36.29	131.15	16	23	03.0	309.1	10	9	20	57.56	129.81	10	44	29.6	530.1
11	7	38	47.44	131.12	16	17	53.9	314.4	11	9	23	07.37	129.79	10	35	39.5	533.9
12	7	40	58.56	131.10	16	12	39.5	319.6	12	9	25	17.16	129.79	10	26	45.6	537.6
13	7	43	09.66	131.07	16	07	19.9	324.9	13	9	27	26.95	129.77	10	17	48.0	541.3
14	7	45	20.73	131.04	16	01	55.0	330.0	14	9	29	36.72	129.77	10	08	46.7	544.9
15	7	47	31.77	131.01	15	56	25.0	335.2	15	9	31	46.49	129.76	9	59	41.8	548.6
16	7	49	42.78	130.99	15	50	49.8	340.3	16	9	33	56.25	129.76	9	50	33.2	552.1
17	7	51	53.77	130.95	15	45	09.5	345.5	17	9	36	06.01	129.75	9	41	21.1	555.7
18	7	54	04.72	130.93	15	39	24.0	350.5	18	9	38	15.76	129.75	9	32	05.4	559.2
19	7	56	15.65	130.89	15	33	33.5	355.6	19	9	40	25.51	129.75	9	22	46.2	562.6
20	7	58	26.54	130.86	15	27	37.9	360.7	20	9	42	35.26	129.75	9	13	23.6	566.0
21	8	00	37.40	130.83	15	21	37.2	365.6	21	9	44	45.01	129.76	9	03	57.6	569.4
22	8	02	48.23	130.80	15	15	31.6	370.7	22	9	46	54.77	129.76	8	54	28.2	572.7
23	8	04	59.03	130.77	15	09	20.9	-375.7	23	9	49	04.53	129.76	8	44	55.5	-576.0
24	8	07	09.80		+15	03	05.2		24	9	51	14.29		+8	35	19.5	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination				
DECEMBER 7									DECEMBER 9									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"	
0	13	25	26.05	141.93	-	8	46	43.5	-626.1	0	15	23	21.90	152.63	-15	48	42.5	-393.6
1	13	27	47.98	142.17		8	57	09.6	623.2	1	15	25	54.53	152.81	15	55	16.1	386.9
2	13	30	10.15	142.41		9	07	32.8	620.2	2	15	28	27.34	152.97	16	01	43.0	380.2
3	13	32	32.56	142.64		9	17	53.0	617.1	3	15	31	00.31	153.14	16	08	03.2	373.3
4	13	34	55.20	142.88		9	28	10.1	613.9	4	15	33	33.45	153.29	16	14	16.5	366.5
5	13	37	18.08	143.11		9	38	24.0	610.7	5	15	36	06.74	153.45	16	20	23.0	359.6
6	13	39	41.19	143.36		9	48	34.7	607.2	6	15	38	40.19	153.59	16	26	22.6	352.7
7	13	42	04.55	143.59		9	58	41.9	603.9	7	15	41	13.78	153.74	16	32	15.3	345.6
8	13	44	28.14	143.82		10	08	45.8	600.3	8	15	43	47.52	153.88	16	38	00.9	338.5
9	13	46	51.96	144.07		10	18	46.1	596.8	9	15	46	21.40	154.02	16	43	39.4	331.4
10	13	49	16.03	144.31		10	28	42.9	593.0	10	15	48	55.42	154.14	16	49	10.8	324.2
11	13	51	40.34	144.55		10	38	35.9	589.3	11	15	51	29.56	154.27	16	54	35.0	316.9
12	13	54	04.89	144.79		10	48	25.2	585.4	12	15	54	03.83	154.39	16	59	51.9	309.7
13	13	56	29.68	145.03		10	58	10.6	581.5	13	15	56	38.22	154.51	17	05	01.6	302.3
14	13	58	54.71	145.27		11	07	52.1	577.5	14	15	59	12.73	154.61	17	10	03.9	295.0
15	14	01	19.98	145.51		11	17	29.6	573.3	15	16	01	47.34	154.72	17	14	58.9	287.5
16	14	03	45.49	145.74		11	27	02.9	569.2	16	16	04	22.06	154.82	17	19	46.4	280.0
17	14	06	11.23	145.99		11	36	32.1	565.0	17	16	06	56.88	154.92	17	24	26.4	272.6
18	14	08	37.22	146.22		11	45	57.1	560.5	18	16	09	31.80	155.00	17	28	59.0	265.0
19	14	11	03.44	146.47		11	55	17.6	556.2	19	16	12	06.80	155.08	17	33	24.0	257.4
20	14	13	29.91	146.70		12	04	33.8	551.6	20	16	14	41.88	155.16	17	37	41.4	249.8
21	14	15	56.61	146.93		12	13	45.4	547.0	21	16	17	17.04	155.23	17	41	51.2	242.1
22	14	18	23.54	147.18		12	22	52.4	542.4	22	16	19	52.27	155.30	17	45	53.3	234.5
23	14	20	50.72	147.41		-12	31	54.8	-537.5	23	16	22	27.57	155.36	-17	49	47.8	-226.7
DECEMBER 8									DECEMBER 10									
0	14	23	18.13	147.64	-12	40	52.3	-532.8	0	16	25	02.93	155.40	-17	53	34.5	-219.0	
1	14	25	45.77	147.87		12	49	45.1	527.8	1	16	27	38.33	155.46	17	57	13.5	211.1
2	14	28	13.64	148.11		12	58	32.9	522.8	2	16	30	13.79	155.50	18	00	44.6	203.4
3	14	30	41.75	148.33		13	07	15.7	517.7	3	16	32	49.29	155.53	18	04	08.0	195.5
4	14	33	10.08	148.57		13	15	53.4	512.6	4	16	35	24.82	155.57	18	07	23.5	187.7
5	14	35	38.65	148.79		13	24	26.0	507.3	5	16	38	00.39	155.58	18	10	31.2	179.7
6	14	38	07.44	149.01		13	32	53.3	502.0	6	16	40	35.97	155.61	18	13	30.9	171.9
7	14	40	36.45	149.24		13	41	15.3	496.7	7	16	43	11.58	155.61	18	16	22.8	164.0
8	14	43	05.69	149.46		13	49	32.0	491.1	8	16	45	47.19	155.61	18	19	06.8	156.1
9	14	45	35.15	149.68		13	57	43.1	485.6	9	16	48	22.80	155.62	18	21	42.9	148.1
10	14	48	04.83	149.89		14	05	48.7	479.9	10	16	50	58.42	155.60	18	24	11.0	140.1
11	14	50	34.72	150.12		14	13	48.6	474.3	11	16	53	34.02	155.59	18	26	31.1	132.1
12	14	53	04.84	150.32		14	21	42.9	468.4	12	16	56	09.61	155.57	18	28	43.2	124.2
13	14	55	35.16	150.53		14	29	31.3	462.7	13	16	58	45.18	155.54	18	30	47.4	116.2
14	14	58	05.69	150.74		14	37	14.0	456.7	14	17	01	20.72	155.50	18	32	43.6	108.2
15	15	00	36.43	150.94		14	44	50.7	450.6	15	17	03	56.22	155.47	18	34	31.8	100.1
16	15	03	07.37	151.15		14	52	21.3	444.7	16	17	06	31.69	155.41	18	36	11.9	92.2
17	15	05	38.52	151.34		14	59	46.0	438.4	17	17	09	07.10	155.37	18	37	44.1	84.1
18	15	08	09.86	151.54		15	07	04.4	432.3	18	17	11	42.47	155.30	18	39	08.2	76.2
19	15	10	41.40	151.73		15	14	16.7	426.0	19	17	14	17.77	155.23	18	40	24.4	68.2
20	15	13	13.13	151.91		15	21	22.7	419.7	20	17	16	53.00	155.17	18	41	32.6	60.2
21	15	15	45.04	152.11		15	28	22.4	413.2	21	17	19	28.17	155.08	18	42	32.8	52.2
22	15	18	17.15	152.28		15	35	15.6	406.7	22	17	22	03.25	154.99	18	43	25.0	44.2
23	15	20	49.43	152.47		15	42	02.3	-400.2	23	17	24	38.24	154.91	18	44	09.2	-36.2
24	15	23	21.90		-15	48	42.5			24	17	27	13.15		-18	44	45.4	

MOON, 1958
UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
DECEMBER 11									DECEMBER 13								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	17	27	13.15	154.80	-18	44	45.4	-28.3	0	19	27	29.00	143.89	-16	47	02.6	+312.0
1	17	29	47.95	154.70	18	45	13.7	20.3	1	19	29	52.89	143.57	16	41	50.6	317.8
2	17	32	22.65	154.59	18	45	34.0	12.4	2	19	32	16.46	143.25	16	36	32.8	323.5
3	17	34	57.24	154.47	18	45	46.4	-4.5	3	19	34	39.71	142.93	16	31	09.3	329.2
4	17	37	31.71	154.35	18	45	50.9	+3.4	4	19	37	02.64	142.60	16	25	40.1	334.7
5	17	40	06.06	154.21	18	45	47.5	11.3	5	19	39	25.24	142.29	16	20	05.4	340.3
6	17	42	40.27	154.08	18	45	36.2	19.2	6	19	41	47.53	141.96	16	14	25.1	345.7
7	17	45	14.35	153.94	18	45	17.0	26.9	7	19	44	09.49	141.63	16	08	39.4	351.0
8	17	47	48.29	153.79	18	44	50.1	34.8	8	19	46	31.12	141.31	16	02	48.4	356.4
9	17	50	22.08	153.64	18	44	15.3	42.6	9	19	48	52.43	140.97	15	56	52.0	361.6
10	17	52	55.72	153.47	18	43	32.7	50.3	10	19	51	13.40	140.65	15	50	50.4	366.8
11	17	55	29.19	153.31	18	42	42.4	58.0	11	19	53	34.05	140.31	15	44	43.6	371.9
12	17	58	02.50	153.14	18	41	44.4	65.8	12	19	55	54.36	139.99	15	38	31.7	376.9
13	18	00	35.64	152.96	18	40	38.6	73.4	13	19	58	14.35	139.65	15	32	14.8	381.9
14	18	03	08.60	152.78	18	39	25.2	81.0	14	20	00	34.00	139.32	15	25	52.9	386.8
15	18	05	41.38	152.58	18	38	04.2	88.7	15	20	02	53.32	138.99	15	19	26.1	391.6
16	18	08	13.96	152.40	18	36	35.5	96.2	16	20	05	12.31	138.65	15	12	54.5	396.4
17	18	10	46.36	152.19	18	34	59.3	103.7	17	20	07	30.96	138.33	15	06	18.1	401.1
18	18	13	18.55	152.00	18	33	15.6	111.1	18	20	09	49.29	137.98	14	59	37.0	405.7
19	18	15	50.55	151.78	18	31	24.5	118.7	19	20	12	07.27	137.66	14	52	51.3	410.3
20	18	18	22.33	151.56	18	29	25.8	126.0	20	20	14	24.93	137.32	14	46	01.0	414.8
21	18	20	53.89	151.35	18	27	19.8	133.3	21	20	16	42.25	136.99	14	39	06.2	419.2
22	18	23	25.24	151.12	18	25	06.5	140.7	22	20	18	59.24	136.66	14	32	07.0	423.6
23	18	25	56.36	150.89	-18	22	45.8	+148.0	23	20	21	15.90	136.32	-14	25	03.4	+427.9
DECEMBER 12									DECEMBER 14								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	18	28	27.25	150.66	-18	20	17.8	+155.2	0	20	23	32.22	135.99	-14	17	55.5	+432.1
1	18	30	57.91	150.42	18	17	42.6	162.3	1	20	25	48.21	135.66	14	10	43.4	436.2
2	18	33	28.33	150.17	18	15	00.3	169.5	2	20	28	03.87	135.33	14	03	27.2	440.4
3	18	35	58.50	149.92	18	12	10.8	176.5	3	20	30	19.20	135.00	13	56	06.8	444.4
4	18	38	28.42	149.68	18	09	14.3	183.6	4	20	32	34.20	134.67	13	48	42.4	448.3
5	18	40	58.10	149.41	18	06	10.7	190.6	5	20	34	48.87	134.33	13	41	14.1	452.3
6	18	43	27.51	149.16	18	03	00.1	197.4	6	20	37	03.20	134.02	13	33	41.8	456.1
7	18	45	56.67	148.89	17	59	42.7	204.3	7	20	39	17.22	133.68	13	26	05.7	459.8
8	18	48	25.56	148.63	17	56	18.4	211.2	8	20	41	30.90	133.36	13	18	25.9	463.6
9	18	50	54.19	148.35	17	52	47.2	217.9	9	20	43	44.26	133.04	13	10	42.3	467.2
10	18	53	22.54	148.07	17	49	09.3	224.5	10	20	45	57.30	132.71	13	02	55.1	470.7
11	18	55	50.61	147.80	17	45	24.8	231.3	11	20	48	10.01	132.39	12	55	04.4	474.3
12	18	58	18.41	147.51	17	41	33.5	237.8	12	20	50	22.40	132.07	12	47	10.1	477.7
13	19	00	45.92	147.23	17	37	35.7	244.3	13	20	52	34.47	131.74	12	39	12.4	481.1
14	19	03	13.15	146.93	17	33	31.4	250.8	14	20	54	46.21	131.44	12	31	11.3	484.4
15	19	05	40.08	146.64	17	29	20.6	257.2	15	20	56	57.65	131.11	12	23	06.9	487.6
16	19	08	06.72	146.35	17	25	03.4	263.6	16	20	59	08.76	130.80	12	14	59.3	490.9
17	19	10	33.07	146.05	17	20	39.8	269.8	17	21	01	19.56	130.49	12	06	48.4	493.9
18	19	12	59.12	145.75	17	16	10.0	276.0	18	21	03	30.05	130.17	11	58	34.5	497.1
19	19	15	24.87	145.44	17	11	34.0	282.2	19	21	05	40.22	129.87	11	50	17.4	500.0
20	19	17	50.31	145.14	17	06	51.8	288.3	20	21	07	50.09	129.56	11	41	57.4	503.0
21	19	20	15.45	144.83	17	02	03.5	294.4	21	21	09	59.65	129.26	11	33	34.4	505.9
22	19	22	40.28	144.52	16	57	09.1	300.3	22	21	12	08.91	128.95	11	25	08.5	508.7
23	19	25	04.80	144.20	16	52	08.8	+306.2	23	21	14	17.86	128.65	11	16	39.8	+511.5
24	19	27	29.00		-16	47	02.6		24	21	16	26.51		-11	08	08.3	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
DECEMBER 15									DECEMBER 17								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	21	16	26.51	128.36	-11	08	08.3	+514.2	0	22	54	18.39	117.21	-3	42	21.1	+583.2
1	21	18	34.87	128.05	10	59	34.1	516.8	1	22	56	15.60	117.06	3	32	37.9	583.6
2	21	20	42.92	127.76	10	50	57.3	519.5	2	22	58	12.66	116.90	3	22	54.3	583.9
3	21	22	50.68	127.47	10	42	17.8	521.9	3	23	00	09.56	116.75	3	13	10.4	584.2
4	21	24	58.15	127.18	10	33	35.9	524.4	4	23	02	06.31	116.60	3	03	26.2	584.4
5	21	27	05.33	126.89	10	24	51.5	526.9	5	23	04	02.91	116.46	2	53	41.8	584.6
6	21	29	12.22	126.61	10	16	04.6	529.2	6	23	05	59.37	116.33	2	43	57.2	584.8
7	21	31	18.83	126.32	10	07	15.4	531.5	7	23	07	55.70	116.18	2	34	12.4	584.8
8	21	33	25.15	126.05	9	58	23.9	533.7	8	23	09	51.88	116.05	2	24	27.6	585.0
9	21	35	31.20	125.77	9	49	30.2	536.0	9	23	11	47.93	115.92	2	14	42.6	585.0
10	21	37	36.97	125.49	9	40	34.2	538.1	10	23	13	43.85	115.80	2	04	57.6	585.0
11	21	39	42.46	125.21	9	31	36.1	540.2	11	23	15	39.65	115.67	1	55	12.6	585.0
12	21	41	47.67	124.95	9	22	35.9	542.2	12	23	17	35.32	115.55	1	45	27.6	584.9
13	21	43	52.62	124.68	9	13	33.7	544.2	13	23	19	30.87	115.44	1	35	42.7	584.8
14	21	45	57.30	124.42	9	04	29.5	546.1	14	23	21	26.31	115.32	1	25	57.9	584.7
15	21	48	01.72	124.16	8	55	23.4	548.0	15	23	23	21.63	115.21	1	16	13.2	584.5
16	21	50	05.88	123.89	8	46	15.4	549.8	16	23	25	16.84	115.10	1	06	28.7	584.3
17	21	52	09.77	123.64	8	37	05.6	551.6	17	23	27	11.94	115.00	0	56	44.4	584.1
18	21	54	13.41	123.39	8	27	54.0	553.3	18	23	29	06.94	114.90	0	47	00.3	583.8
19	21	56	16.80	123.14	8	18	40.7	554.9	19	23	31	01.84	114.81	0	37	16.5	583.6
20	21	58	19.94	122.89	8	09	25.8	556.6	20	23	32	56.65	114.70	0	27	32.9	583.1
21	22	00	22.83	122.64	8	00	09.2	558.2	21	23	34	51.35	114.62	0	17	49.8	582.8
22	22	02	25.47	122.40	7	50	51.0	559.6	22	23	36	45.97	114.53	-0	08	07.0	582.4
23	22	04	27.87	122.17	-7	41	31.4	+561.2	23	23	38	40.50	114.45	+0	01	35.4	+582.0
DECEMBER 16									DECEMBER 18								
0	22	06	30.04	121.93	-7	32	10.2	+562.6	0	23	40	34.95	114.36	+0	11	17.4	+581.5
1	22	08	31.97	121.69	7	22	47.6	563.9	1	23	42	29.31	114.29	0	20	58.9	581.0
2	22	10	33.66	121.47	7	13	23.7	565.3	2	23	44	23.60	114.22	0	30	39.9	580.5
3	22	12	35.13	121.24	7	03	58.4	566.5	3	23	46	17.82	114.14	0	40	20.4	579.9
4	22	14	36.37	121.01	6	54	31.9	567.8	4	23	48	11.96	114.07	0	50	00.3	579.3
5	22	16	37.38	120.80	6	45	04.1	569.0	5	23	50	06.03	114.01	0	59	39.6	578.6
6	22	18	38.18	120.58	6	35	35.1	570.1	6	23	52	00.04	113.95	1	09	18.2	578.0
7	22	20	38.76	120.36	6	26	05.0	571.2	7	23	53	53.99	113.88	1	18	56.2	577.3
8	22	22	39.12	120.16	6	16	33.8	572.3	8	23	55	47.87	113.84	1	28	33.5	576.6
9	22	24	39.28	119.94	6	07	01.5	573.2	9	23	57	41.71	113.78	1	38	10.1	575.8
10	22	26	39.22	119.74	5	57	28.3	574.2	10	23	59	35.49	113.73	1	47	45.9	575.1
11	22	28	38.96	119.54	5	47	54.1	575.2	11	0	01	29.22	113.68	1	57	21.0	574.2
12	22	30	38.50	119.34	5	38	18.9	576.0	12	0	03	22.90	113.65	2	06	55.2	573.4
13	22	32	37.84	119.14	5	28	42.9	576.8	13	0	05	16.55	113.60	2	16	28.6	572.4
14	22	34	36.98	118.95	5	19	06.1	577.7	14	0	07	10.15	113.56	2	26	01.0	571.6
15	22	36	35.93	118.77	5	09	28.4	578.3	15	0	09	03.71	113.54	2	35	32.6	570.6
16	22	38	34.70	118.58	4	59	50.1	579.1	16	0	10	57.25	113.50	2	45	03.2	569.7
17	22	40	33.28	118.39	4	50	11.0	579.8	17	0	12	50.75	113.47	2	54	32.9	568.6
18	22	42	31.67	118.22	4	40	31.2	580.3	18	0	14	44.22	113.45	3	04	01.5	567.6
19	22	44	29.89	118.04	4	30	50.9	581.0	19	0	16	37.67	113.43	3	13	29.1	566.6
20	22	46	27.93	117.86	4	21	09.9	581.5	20	0	18	31.10	113.41	3	22	55.7	565.4
21	22	48	25.79	117.70	4	11	28.4	581.9	21	0	20	24.51	113.40	3	32	21.1	564.3
22	22	50	23.49	117.53	4	01	46.5	582.5	22	0	22	17.91	113.38	3	41	45.4	563.2
23	22	52	21.02	117.37	3	52	04.0	+582.9	23	0	24	11.29	113.38	3	51	08.6	+562.0
24	22	54	18.39		-3	42	21.1		24	0	26	04.67		+4	00	30.6	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
DECEMBER 19									DECEMBER 21										
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	0	26	04.67	113.36	+	4	00	30.6	+560.7	0	1	57	30.68	116.25	+10	57	02.1	+467.0	
1	0	27	58.03	113.37		4	09	51.3	559.6	1	1	59	26.93	116.36		11	04	49.1	464.2
2	0	29	51.40	113.37		4	19	10.9	558.2	2	2	01	23.29	116.49		11	12	33.3	461.5
3	0	31	44.77	113.36		4	28	29.1	556.9	3	2	03	19.78	116.61		11	20	14.8	458.8
4	0	33	38.13	113.38		4	37	46.0	555.6	4	2	05	16.39	116.73		11	27	53.6	455.9
5	0	35	31.51	113.38		4	47	01.6	554.3	5	2	07	13.12	116.85		11	35	29.5	453.1
6	0	37	24.89	113.39		4	56	15.9	552.8	6	2	09	09.97	116.99		11	43	02.6	450.2
7	0	39	18.28	113.41		5	05	28.7	551.4	7	2	11	06.96	117.11		11	50	32.8	447.4
8	0	41	11.69	113.43		5	14	40.1	550.0	8	2	13	04.07	117.24		11	58	00.2	444.4
9	0	43	05.12	113.44		5	23	50.1	548.4	9	2	15	01.31	117.37		12	05	24.6	441.4
10	0	44	58.56	113.47		5	32	58.5	547.0	10	2	16	58.68	117.51		12	12	46.0	438.4
11	0	46	52.03	113.50		5	42	05.5	545.4	11	2	18	56.19	117.64		12	20	04.4	435.4
12	0	48	45.53	113.52		5	51	10.9	543.8	12	2	20	53.83	117.78		12	27	19.8	432.3
13	0	50	39.05	113.55		6	00	14.7	542.2	13	2	22	51.61	117.91		12	34	32.1	429.2
14	0	52	32.60	113.59		6	09	16.9	540.6	14	2	24	49.52	118.06		12	41	41.3	426.1
15	0	54	26.19	113.63		6	18	17.5	538.9	15	2	26	47.58	118.20		12	48	47.4	423.0
16	0	56	19.82	113.66		6	27	16.4	537.3	16	2	28	45.78	118.34		12	55	50.4	419.7
17	0	58	13.48	113.71		6	36	13.7	535.5	17	2	30	44.12	118.49		13	02	50.1	416.5
18	1	00	07.19	113.75		6	45	09.2	533.7	18	2	32	42.61	118.63		13	09	46.6	413.3
19	1	02	00.94	113.80		6	54	02.9	532.0	19	2	34	41.24	118.78		13	16	39.9	409.9
20	1	03	54.74	113.85		7	02	54.9	530.1	20	2	36	40.02	118.92		13	23	29.8	406.6
21	1	05	48.59	113.90		7	11	45.0	528.3	21	2	38	38.94	119.08		13	30	16.4	403.3
22	1	07	42.49	113.96		7	20	33.3	526.4	22	2	40	38.02	119.22		13	36	59.7	399.9
23	1	09	36.45	114.02	+	7	29	19.7	+524.5	23	2	42	37.24	119.38	+	13	43	39.6	+396.4
DECEMBER 20									DECEMBER 22										
0	1	11	30.47	114.07	+	7	38	04.2	+522.6	0	2	44	36.62	119.54	+	13	50	16.0	+293.0
1	1	13	24.54	114.14		7	46	46.8	520.7	1	2	46	36.16	119.68		13	56	49.0	389.5
2	1	15	18.68	114.21		7	55	27.5	518.6	2	2	48	35.84	119.84		14	03	18.5	385.9
3	1	17	12.89	114.27		8	04	06.1	516.6	3	2	50	35.68	120.00		14	09	44.4	382.4
4	1	19	07.16	114.35		8	12	42.7	514.5	4	2	52	35.68	120.16		14	16	06.8	378.8
5	1	21	01.51	114.42		8	21	17.2	512.5	5	2	54	35.84	120.31		14	22	25.6	375.2
6	1	22	55.93	114.49		8	29	49.7	510.3	6	2	56	36.15	120.48		14	28	40.8	371.5
7	1	24	50.42	114.58		8	38	20.0	508.2	7	2	58	36.63	120.63		14	34	52.3	367.8
8	1	26	45.00	114.65		8	46	48.2	506.1	8	3	00	37.26	120.79		14	41	00.1	364.1
9	1	28	39.65	114.74		8	55	14.3	503.8	9	3	02	38.05	120.96		14	47	04.2	360.3
10	1	30	34.39	114.82		9	03	38.1	501.5	10	3	04	39.01	121.12		14	53	04.5	356.6
11	1	32	29.21	114.91		9	11	59.6	499.3	11	3	06	40.13	121.28		14	59	01.1	352.7
12	1	34	24.12	115.00		9	20	18.9	497.0	12	3	08	41.41	121.44		15	04	53.8	348.8
13	1	36	19.12	115.09		9	28	35.9	494.7	13	3	10	42.85	121.61		15	10	42.6	344.9
14	1	38	14.21	115.18		9	36	50.6	492.3	14	3	12	44.46	121.78		15	16	27.5	341.0
15	1	40	09.39	115.29		9	45	02.9	489.9	15	3	14	46.24	121.94		15	22	08.5	337.1
16	1	42	04.68	115.38		9	53	12.8	487.5	16	3	16	48.18	122.10		15	27	45.6	333.0
17	1	44	00.06	115.48		10	01	20.3	485.0	17	3	18	50.28	122.28		15	33	18.6	329.0
18	1	45	55.54	115.59		10	09	25.3	482.5	18	3	20	52.56	122.44		15	38	47.6	325.0
19	1	47	51.13	115.69		10	17	27.8	480.1	19	3	22	55.00	122.60		15	44	12.6	320.8
20	1	49	46.82	115.80		10	25	27.9	477.4	20	3	24	57.60	122.77		15	49	33.4	316.7
21	1	51	42.62	115.90		10	33	25.3	474.9	21	3	27	00.37	122.94		15	54	50.1	312.6
22	1	53	38.52	116.02		10	41	20.2	472.3	22	3	29	03.31	123.11		16	00	02.7	308.3
23	1	55	34.54	116.14		10	49	12.5	469.6	23	3	31	06.42	123.28		16	05	11.0	+304.1
24	1	57	30.68		+	10	57	02.1		24	3	33	09.70		+	16	10	15.1	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination					
DECEMBER 23										DECEMBER 25									
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"		
0	3	33	09.70	123.44	+16	10	15.1	+299.9	0	5	14	55.00	130.68	+18	40	33.1	+60.3		
1	3	35	13.14	123.61		16	15	15.0	295.6	1	5	17	05.68	130.79		18	41	33.4	54.8
2	3	37	16.75	123.78		16	20	10.6	291.2	2	5	19	16.47	130.91		18	42	28.2	49.1
3	3	39	20.53	123.95		16	25	01.8	286.9	3	5	21	27.38	131.02		18	43	17.3	43.5
4	3	41	24.48	124.12		16	29	48.7	282.5	4	5	23	38.40	131.12		18	44	00.8	37.8
5	3	43	28.60	124.28		16	34	31.2	278.0	5	5	25	49.52	131.24		18	44	38.6	32.2
6	3	45	32.88	124.45		16	39	09.2	273.6	6	5	28	00.76	131.33		18	45	10.8	26.6
7	3	47	37.33	124.62		16	43	42.8	269.1	7	5	30	12.09	131.44		18	45	37.4	20.8
8	3	49	41.95	124.78		16	48	11.9	264.6	8	5	32	23.53	131.54		18	45	58.2	15.1
9	3	51	46.73	124.95		16	52	36.5	260.1	9	5	34	35.07	131.64		18	46	13.3	9.4
10	3	53	51.68	125.12		16	56	56.6	255.4	10	5	36	46.71	131.73		18	46	22.7	+3.7
11	3	55	56.80	125.28		17	01	12.0	250.8	11	5	38	58.44	131.83		18	46	26.4	-2.1
12	3	58	02.08	125.45		17	05	22.8	246.2	12	5	41	10.27	131.92		18	46	24.3	7.8
13	4	00	07.53	125.61		17	09	29.0	241.5	13	5	43	22.19	132.00		18	46	16.5	13.6
14	4	02	13.14	125.78		17	13	30.5	236.8	14	5	45	34.19	132.09		18	46	02.9	19.4
15	4	04	18.92	125.94		17	17	27.3	232.1	15	5	47	46.28	132.18		18	45	43.5	25.1
16	4	06	24.86	126.10		17	21	19.4	227.2	16	5	49	58.46	132.26		18	45	18.4	31.0
17	4	08	30.96	126.26		17	25	06.6	222.5	17	5	52	10.72	132.33		18	44	47.4	36.7
18	4	10	37.22	126.43		17	28	49.1	217.7	18	5	54	23.05	132.41		18	44	10.7	42.6
19	4	12	43.65	126.58		17	32	26.8	212.8	19	5	56	35.46	132.49		18	43	28.1	48.4
20	4	14	50.23	126.75		17	35	59.6	207.9	20	5	58	47.95	132.56		18	42	39.7	54.3
21	4	16	56.98	126.90		17	39	27.5	203.0	21	6	01	00.51	132.62		18	41	45.4	60.0
22	4	19	03.88	127.06		17	42	50.5	198.0	22	6	03	13.13	132.69		18	40	45.4	65.9
23	4	21	10.94	127.22		+17	46	08.5	+193.0	23	6	05	25.82	132.76		+18	39	39.5	-71.8
DECEMBER 24										DECEMBER 26									
0	4	23	18.16	127.38		+17	49	21.5	+188.1	0	6	07	38.58	132.82		+18	38	27.7	-77.6
1	4	25	25.54	127.53		17	52	29.6	183.0	1	6	09	51.40	132.88		18	37	10.1	83.5
2	4	27	33.07	127.68		17	55	32.6	178.0	2	6	12	04.28	132.93		18	35	46.6	89.3
3	4	29	40.75	127.83		17	58	30.6	172.8	3	6	14	17.21	132.99		18	34	17.3	95.2
4	4	31	48.58	127.99		18	01	23.4	167.8	4	6	16	30.20	133.04		18	32	42.1	101.0
5	4	33	56.57	128.14		18	04	11.2	162.6	5	6	18	43.24	133.09		18	31	01.1	106.9
6	4	36	04.71	128.28		18	06	53.8	157.4	6	6	20	56.33	133.14		18	29	14.2	112.8
7	4	38	12.99	128.43		18	09	31.2	152.3	7	6	23	09.47	133.18		18	27	21.4	118.6
8	4	40	21.42	128.58		18	12	03.5	147.0	8	6	25	22.65	133.22		18	25	22.8	124.5
9	4	42	30.00	128.71		18	14	30.5	141.8	9	6	27	35.87	133.26		18	23	18.3	130.3
10	4	44	38.71	128.87		18	16	52.3	136.5	10	6	29	49.13	133.30		18	21	08.0	136.2
11	4	46	47.58	129.00		18	19	08.8	131.2	11	6	32	02.43	133.33		18	18	51.8	142.1
12	4	48	56.58	129.14		18	21	20.0	125.9	12	6	34	15.76	133.36		18	16	29.7	147.9
13	4	51	05.72	129.28		18	23	25.9	120.5	13	6	36	29.12	133.40		18	14	01.8	153.7
14	4	53	15.00	129.42		18	25	26.4	115.2	14	6	38	42.52	133.42		18	11	28.1	159.6
15	4	55	24.42	129.55		18	27	21.6	109.8	15	6	40	55.94	133.44		18	08	48.5	165.4
16	4	57	33.97	129.69		18	29	11.4	104.4	16	6	43	09.38	133.47		18	06	03.1	171.3
17	4	59	43.66	129.81		18	30	55.8	98.9	17	6	45	22.85	133.49		18	03	11.8	177.1
18	5	01	53.47	129.95		18	32	34.7	93.5	18	6	47	36.34	133.50		18	00	14.7	182.8
19	5	04	03.42	130.07		18	34	08.2	88.0	19	6	49	49.84	133.52		17	57	11.9	188.7
20	5	06	13.49	130.19		18	35	36.2	82.5	20	6	52	03.36	133.54		17	54	03.2	194.5
21	5	08	23.68	130.32		18	36	58.7	77.0	21	6	54	16.90	133.54		17	50	48.7	200.2
22	5	10	34.00	130.44		18	38	15.7	71.5	22	6	56	30.44	133.55		17	47	28.5	206.1
23	5	12	44.44	130.56		18	39	27.2	+65.9	23	6	58	43.99	133.56		17	44	02.4	-211.8
24	5	14	55.00			+18	40	33.1		24	7	00	57.55			+17	40	30.6	

UNIVERSAL TIME

Hour	Right Ascension				Declination				Hour	Right Ascension				Declination			
DECEMBER 27									DECEMBER 29								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	7	00	57.55	133.56	+17	40	30.6	-217.5	0	8	47	19.76	131.84	+13	04	35.4	-466.8
1	7	03	11.11	133.56	17	36	53.1	223.3	1	8	49	31.60	131.79	12	56	48.6	471.2
2	7	05	24.67	133.57	17	33	09.8	229.0	2	8	51	43.39	131.74	12	48	57.4	475.6
3	7	07	38.24	133.55	17	29	20.8	234.7	3	8	53	55.13	131.67	12	41	01.8	479.9
4	7	09	51.79	133.56	17	25	26.1	240.4	4	8	56	06.80	131.62	12	33	01.9	484.2
5	7	12	05.35	133.55	17	21	25.7	246.1	5	8	58	18.42	131.57	12	24	57.7	488.4
6	7	14	18.90	133.53	17	17	19.6	251.8	6	9	00	29.99	131.51	12	16	49.3	492.6
7	7	16	32.43	133.53	17	13	07.8	257.4	7	9	02	41.50	131.45	12	08	36.7	496.7
8	7	18	45.96	133.52	17	08	50.4	263.0	8	9	04	52.95	131.39	12	00	20.0	500.9
9	7	20	59.48	133.50	17	04	27.4	268.6	9	9	07	04.34	131.35	11	51	59.1	505.0
10	7	23	12.98	133.48	16	59	58.8	274.3	10	9	09	15.69	131.28	11	43	34.1	508.9
11	7	25	26.46	133.46	16	55	24.5	279.8	11	9	11	26.97	131.23	11	35	05.2	513.0
12	7	27	39.92	133.45	16	50	44.7	285.3	12	9	13	38.20	131.18	11	26	32.2	516.9
13	7	29	53.37	133.42	16	45	59.4	290.9	13	9	15	49.38	131.13	11	17	55.3	520.8
14	7	32	06.79	133.39	16	41	08.5	296.4	14	9	18	00.51	131.07	11	09	14.5	524.6
15	7	34	20.18	133.37	16	36	12.1	301.9	15	9	20	11.58	131.02	11	00	29.9	528.4
16	7	36	33.55	133.35	16	31	10.2	307.3	16	9	22	22.60	130.97	10	51	41.5	532.2
17	7	38	46.90	133.31	16	26	02.9	312.8	17	9	24	33.57	130.92	10	42	49.3	535.9
18	7	41	00.21	133.28	16	20	50.1	318.2	18	9	26	44.49	130.86	10	33	53.4	539.6
19	7	43	13.49	133.25	16	15	31.9	323.6	19	9	28	55.35	130.82	10	24	53.8	543.2
20	7	45	26.74	133.22	16	10	08.3	329.0	20	9	31	06.17	130.78	10	15	50.6	546.8
21	7	47	39.96	133.18	16	04	39.3	334.3	21	9	33	16.95	130.72	10	06	43.8	550.2
22	7	49	53.14	133.15	15	59	05.0	339.6	22	9	35	27.67	130.68	9	57	33.6	553.8
23	7	52	06.29	133.10	+15	53	25.4	-344.9	23	9	37	38.35	130.63	+9	48	19.8	-557.2
DECEMBER 28									DECEMBER 30								
0	7	54	19.39	133.07	+15	47	40.5	-350.2	0	9	39	48.98	130.59	+9	39	02.6	-560.6
1	7	56	32.46	133.03	15	41	50.3	355.4	1	9	41	59.57	130.55	9	29	42.0	563.9
2	7	58	45.49	132.98	15	35	54.9	360.7	2	9	44	10.12	130.51	9	20	18.1	567.2
3	8	00	58.47	132.94	15	29	54.2	365.7	3	9	46	20.63	130.46	9	10	50.9	570.4
4	8	03	11.41	132.90	15	23	48.5	371.0	4	9	48	31.09	130.43	9	01	20.5	573.7
5	8	05	24.31	132.85	15	17	37.5	376.0	5	9	50	41.52	130.39	8	51	46.8	576.7
6	8	07	37.16	132.80	15	11	21.5	381.2	6	9	52	51.91	130.35	8	42	10.1	579.9
7	8	09	49.96	132.76	15	05	00.3	386.2	7	9	55	02.26	130.32	8	32	30.2	582.9
8	8	12	02.72	132.71	14	58	34.1	391.2	8	9	57	12.58	130.28	8	22	47.3	585.8
9	8	14	15.43	132.66	14	52	02.9	396.2	9	9	59	22.86	130.25	8	13	01.5	588.9
10	8	16	28.09	132.61	14	45	26.7	401.1	10	10	01	33.11	130.22	8	03	12.6	591.7
11	8	18	40.70	132.56	14	38	45.6	406.1	11	10	03	43.33	130.20	7	53	20.9	594.5
12	8	20	53.26	132.50	14	31	59.5	411.0	12	10	05	53.53	130.16	7	43	26.4	597.3
13	8	23	05.76	132.46	14	25	08.5	415.8	13	10	08	03.69	130.14	7	33	29.1	600.1
14	8	25	18.22	132.40	14	18	12.7	420.7	14	10	10	13.83	130.12	7	23	29.0	602.7
15	8	27	30.62	132.34	14	11	12.0	425.4	15	10	12	23.95	130.09	7	13	26.3	605.4
16	8	29	42.96	132.30	14	04	06.6	430.2	16	10	14	34.04	130.08	7	03	20.9	608.0
17	8	31	55.26	132.23	13	56	56.4	434.9	17	10	16	44.12	130.05	6	53	12.9	610.4
18	8	34	07.49	132.19	13	49	41.5	439.5	18	10	18	54.17	130.04	6	43	02.5	613.0
19	8	36	19.68	132.13	13	42	22.0	444.2	19	10	21	04.21	130.02	6	32	49.5	615.4
20	8	38	31.81	132.07	13	34	57.8	448.8	20	10	23	14.23	130.01	6	22	34.1	617.7
21	8	40	43.88	132.01	13	27	29.0	453.4	21	10	25	24.24	130.00	6	12	16.4	620.1
22	8	42	55.89	131.96	13	19	55.6	457.9	22	10	27	34.24	129.99	6	01	56.3	622.3
23	8	45	07.85	131.91	13	12	17.7	-462.3	23	10	29	44.23	129.99	5	51	34.0	-624.5
24	8	47	19.76		+13	04	35.4		24	10	31	54.22		+5	41	09.5	

UNIVERSAL TIME

Hour	Right Ascension	Declination	Hour	Right Ascension	Declination
DECEMBER 31					
0	h m s 10 31 54.22 ^s	° ' " " +5 41 09.5 -626.7	12	h m s 10 57 54.24 ^s	° ' " " +3 33 42.6 -648.3
1	10 34 04.19 ^{129.97}	5 30 42.8 ^{-626.7}	13	11 00 04.33 ^{130.09}	3 22 54.3 ^{-648.3}
2	10 36 14.17 ^{129.98}	5 20 14.0 ^{628.8}	14	11 02 14.44 ^{130.11}	3 12 04.6 ^{649.7}
3	10 38 24.14 ^{129.97}	5 09 43.2 ^{630.8}	15	11 04 24.58 ^{130.14}	3 01 13.5 ^{651.1}
4	10 40 34.12 ^{129.98}	4 59 10.3 ^{632.9}	16	11 06 34.75 ^{130.17}	2 50 21.1 ^{652.4}
5	10 42 44.10 ^{129.98}	4 48 35.6 ^{634.7}	17	11 08 44.95 ^{130.20}	2 39 27.4 ^{653.7}
6	10 44 54.08 ^{129.99}	4 37 58.9 ^{636.7}	18	11 10 55.18 ^{130.23}	2 28 32.5 ^{654.9}
7	10 47 04.07 ^{129.99}	4 27 20.5 ^{638.4}	19	11 13 05.45 ^{130.27}	2 17 36.5 ^{656.0}
8	10 49 14.08 ^{130.01}	4 16 40.2 ^{640.3}	20	11 15 15.76 ^{130.31}	2 06 39.3 ^{657.2}
9	10 51 24.09 ^{130.01}	4 05 58.2 ^{642.0}	21	11 17 26.11 ^{130.35}	1 55 41.2 ^{658.1}
10	10 53 34.12 ^{130.03}	3 55 14.6 ^{643.6}	22	11 19 36.51 ^{130.40}	1 44 42.0 ^{659.2}
11	10 55 44.17 ^{130.05}	3 44 29.4 ^{645.2}	23	11 21 46.95 ^{130.44}	1 33 42.0 ^{660.0}
12	10 57 54.24 ^{130.07}	+3 33 42.6 ^{-646.8}	24	11 23 57.44 ^{130.49}	+1 22 41.0 ^{-661.0}

PHASES OF THE MOON

	d h m	d h m	d h m	d h m
○ Full Moon	Jan. 5 20 09	Apr. 4 03 45	July 1 06 04	Sept. 27 21 43
☾ Last Quarter	12 14 01	10 23 50	9 00 21	Oct. 6 01 20
● New Moon	19 22 08	19 03 23	16 18 33	12 20 52
☾ First Quarter	28 02 16	26 21 36	23 14 19	19 14 07
○ Full Moon	Feb. 4 08 05	May 3 12 23	30 16 47	27 15 41
☾ Last Quarter	10 23 34	10 14 37	Aug. 7 17 49	Nov. 4 14 19
● New Moon	18 15 38	18 19 00	15 03 33	11 06 34
☾ First Quarter	26 20 51	26 04 38	21 19 45	18 04 59
○ Full Moon	Mar. 5 18 28	June 1 20 55	29 05 53	26 10 16
☾ Last Quarter	12 10 48	9 06 59	Sept. 6 10 24	Dec. 4 01 24
● New Moon	20 09 50	17 07 59	13 12 02	10 17 23
☾ First Quarter	28 11 18	24 09 44	20 03 17	17 23 52
○ Full Moon	Apr. 4 03 45	July 1 06 04	27 21 43	26 03 54
☾ Last Quarter	10 23 50	9 00 21	Oct. 6 01 20	33 10 50

PERIGEE

d h	d h
January 9 00	July 21 11
February 5 23	August 17 15
March 6 09	September 14 17
April 3 21	October 13 02
May 2 06	November 10 14
May 30 07	December 9 00
June 26 09	

APOGEE

d h	d h
January 25 00	August 5 18
February 21 15	September 2 11
March 20 19	September 29 22
April 16 23	October 27 00
May 14 11	November 23 05
June 11 05	December 20 21
July 8 23	

UNIVERSAL TIME

Date	Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich
	° ' "	° ' "	' "	' " "	d	d h m m
Jan. 0.0	28 40 51.1	+0 53 16.1	14 57.71	54 54.70	9.7	L 0 07 22.2
0.5	34 45 25.5	+0 20 57.9	15 01.96	55 10.32		U 0 19 45.5
1.0	40 53 57.3	-0 11 54.3	15 06.78	55 28.01	10.7	L 1 08 09.4
1.5	47 07 00.7	0 45 00.1	15 12.10	55 47.52		U 1 20 34.0
2.0	53 25 05.7	1 17 57.4	15 17.82	56 08.53	11.7	L 2 08 59.4
2.5	59 48 37.6	-1 50 22.0	15 23.86	56 30.69		U 2 21 25.5
3.0	66 17 55.6	2 21 47.6	15 30.10	56 53.59	12.7	L 3 09 52.3
3.5	72 53 12.2	2 51 46.2	15 36.42	57 16.81		U 3 22 19.6
4.0	79 34 31.8	3 19 48.3	15 42.70	57 39.86	13.7	L 4 10 47.5
4.5	86 21 50.1	3 45 23.9	15 48.81	58 02.28		U 4 23 15.7
5.0	93 14 54.0	-4 08 03.1	15 54.61	58 23.58	14.7	L 5 11 44.1
5.5	100 13 21.3	4 27 16.8	15 59.99	58 43.30		.. .. .
6.0	107 16 41.1	4 42 38.8	16 04.82	59 01.04	15.7	U 6 00 12.6
6.5	114 24 14.5	4 53 46.1	16 09.02	59 16.44		L 6 12 41.0
7.0	121 35 16.4	5 00 20.5	16 12.50	59 29.21	16.7	U 7 01 09.1
7.5	128 48 56.8	-5 02 09.3	16 15.21	59 39.16		L 7 13 37.0
8.0	136 04 23.6	4 59 06.5	16 17.12	59 46.19	17.7	U 8 02 04.5
8.5	143 20 44.4	4 51 12.8	16 18.25	59 50.32		L 8 14 31.6
9.0	150 37 08.7	4 38 35.7	16 18.60	59 51.62	18.7	U 9 02 58.4
9.5	157 52 50.2	4 21 29.1	16 18.23	59 50.26		L 9 15 24.8
10.0	165 07 08.3	-4 00 12.6	16 17.20	59 46.48	19.7	U 10 03 51.1
10.5	172 19 28.9	3 35 10.9	16 15.58	59 40.54		L 10 16 17.1
11.0	179 29 25.2	3 06 52.5	16 13.46	59 32.74	20.7	U 11 04 43.0
11.5	186 36 37.7	2 35 48.5	16 10.91	59 23.38		L 11 17 08.9
12.0	193 40 53.6	2 02 32.1	16 08.02	59 12.76	21.7	U 12 05 34.9
12.5	200 42 06.2	-1 27 37.6	16 04.85	59 01.14		L 12 18 01.0
13.0	207 40 13.6	0 51 39.2	16 01.47	58 48.74	22.7	U 13 06 27.3
13.5	214 35 17.6	-0 15 10.9	15 57.94	58 35.77		L 13 18 53.8
14.0	221 27 22.5	+0 21 14.2	15 54.29	58 22.37	23.7	U 14 07 20.5
14.5	228 16 34.1	0 57 04.4	15 50.55	58 08.67		L 14 19 47.4
15.0	235 02 58.1	+1 31 49.6	15 46.76	57 54.74	24.7	U 15 08 14.5
15.5	241 46 40.0	2 05 01.8	15 42.92	57 40.65		L 15 20 41.7
16.0	248 27 43.7	2 36 15.0	15 39.04	57 26.42	25.7	U 16 09 08.9
16.5	255 06 11.6	3 05 05.8	15 35.13	57 12.08		L 16 21 36.0
17.0	261 42 03.9	3 31 13.6	15 31.20	56 57.65	26.7	U 17 10 02.8
17.5	268 15 19.1	+3 54 20.6	15 27.25	56 43.15		L 17 22 29.3
18.0	274 45 54.0	4 14 12.1	15 23.29	56 28.62	27.7	U 18 10 55.4
18.5	281 13 44.0	4 30 36.7	15 19.34	56 14.11		L 18 23 21.1
19.0	287 38 44.0	4 43 26.3	15 15.41	55 59.70	28.7	U 19 11 46.1
19.5	294 00 48.6	4 52 35.9	15 11.54	55 45.47		.. .. .
20.0	300 19 53.4	+4 58 04.0	15 07.75	55 31.55	0.1	L 20 00 10.6
20.5	306 35 55.2	4 59 51.6	15 04.08	55 18.08		U 20 12 34.5
21.0	312 48 53.0	4 58 02.8	15 00.57	55 05.22	1.1	L 21 00 57.8
21.5	318 58 48.3	4 52 44.2	14 57.28	54 53.14		U 21 13 20.5
22.0	325 05 45.9	4 44 04.3	14 54.26	54 42.04	2.1	L 22 01 42.8
22.5	331 09 54.1	+4 32 13.3	14 51.55	54 32.10		U 22 14 04.6
23.0	337 11 25.3	+4 17 22.9	14 49.22	54 23.53	3.1	L 23 02 26.1

UNIVERSAL TIME

Date		Longitude	Latitude		Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich			
		° ' "	° ' "	' "	' "	' "	d	d	h	m	m
Jan.	23.0	337 11 25.3	+4 17 22.9	14 49.22	54 23.53	"	3.1	L	23 02 26.1	21.3	
	23.5	343 10 35.4	3 59 45.8	14 47.31	54 16.53	- 7.00		U	23 14 47.4	21.0	
	24.0	349 07 44.3	3 39 35.6	14 45.88	54 11.29	5.24	4.1	L	24 03 08.4	20.9	
	24.5	355 03 16.0	3 17 06.1	14 44.98	54 07.99	3.30		U	24 15 29.3	21.0	
	25.0	0 57 37.8	2 52 31.8	14 44.66	54 06.80	- 1.19	5.1	L	25 03 50.3	21.0	
	25.5	6 51 20.8	+2 26 07.3	14 44.95	54 07.87	+ 1.07		U	25 16 11.3	21.2	
	26.0	12 44 58.9	1 58 07.4	14 45.89	54 11.31	+ 3.44	6.1	L	26 04 32.5	21.5	
	26.5	18 39 08.8	1 28 47.5	14 47.50	54 17.23	5.92		U	26 16 54.0	21.9	
	27.0	24 34 29.5	0 58 22.8	14 49.80	54 25.69	8.46	7.1	L	27 05 15.9	22.3	
	27.5	30 31 41.7	+0 27 09.5	14 52.81	54 36.73	11.04		U	27 17 38.2	22.9	
	28.0	36 31 27.3	-0 04 35.6	14 56.52	54 50.34	13.61	8.1	L	28 06 01.1	23.4	
	28.5	42 34 28.7	0 36 34.9	15 00.91	55 06.47	+16.13		U	28 18 24.5	24.1	
	29.0	48 41 28.1	1 08 29.5	15 05.97	55 25.02	18.55	9.1	L	29 06 48.6	24.8	
	29.5	54 53 06.3	1 39 59.2	15 11.64	55 45.83	20.81		U	29 19 13.4	25.5	
	30.0	61 10 02.1	2 10 42.0	15 17.86	56 08.67	22.84	10.1	L	30 07 38.9	26.2	
	30.5	67 32 50.7	-2 40 14.4	15 24.56	56 33.26	24.59		U	30 20 05.1	26.8	
	31.0	74 02 02.5	3 08 11.1	15 31.64	56 59.25	+25.99	11.1	L	31 08 31.9	27.4	
	31.5	80 38 01.6	3 34 05.1	15 38.99	57 26.21	26.96		U	31 20 59.3	27.9	
Feb.	1.0	87 21 04.3	3 57 28.3	15 46.46	57 53.64	27.43	12.1	L	1 09 27.2	28.2	
	1.5	94 11 17.6	4 17 51.9	15 53.91	58 20.99	27.35		U	1 21 55.4	28.5	
	2.0	101 08 37.8	-4 34 47.5	16 01.18	58 47.66	26.67	13.1	L	2 10 23.9	28.5	
	2.5	108 12 49.7	4 47 48.0	16 08.08	59 13.00	+25.34		U	2 22 52.4	28.5	
	3.0	115 23 25.7	4 56 28.8	16 14.45	59 36.38	23.38	14.1	L	3 11 20.9	28.4	
	3.5	122 39 46.0	5 00 29.5	16 20.12	59 57.19	20.81		U	3 23 49.3	28.2	
	4.0	130 00 59.9	4 59 35.4	16 24.93	60 14.85	17.66	15.1	..	..	..	
	4.5	137 26 06.8	-4 53 38.6	16 28.76	60 28.91	14.06		L	4 12 17.5	28.0	
	5.0	144 53 59.3	4 42 39.2	16 31.51	60 39.00	+10.09	16.1	U	5 00 45.5	27.7	
	5.5	152 23 25.5	4 26 45.2	16 33.12	60 44.91	5.91		L	5 13 13.2	27.5	
	6.0	159 53 13.1	4 06 13.2	16 33.58	60 46.58	+ 1.67	17.1	U	6 01 40.7	27.3	
	6.5	167 22 11.9	3 41 27.4	16 32.90	60 44.10	- 2.48		L	6 14 08.0	27.1	
	7.0	174 49 17.4	-3 12 58.5	16 31.15	60 37.69	6.41	18.1	U	7 02 35.1	26.9	
	7.5	182 13 32.8	2 41 22.1	16 28.43	60 27.70	- 9.99		L	7 15 02.0	27.0	
	8.0	189 34 11.2	2 07 17.1	16 24.86	60 14.57	13.13	19.1	U	8 03 29.0	26.9	
	8.5	196 50 35.8	1 31 24.2	16 20.56	59 58.82	15.75		L	8 15 55.9	26.9	
	9.0	204 02 20.4	0 54 23.9	16 15.70	59 40.96	17.86	20.1	U	9 04 22.8	27.0	
	9.5	211 09 08.8	-0 16 55.9	16 10.41	59 21.53	19.43		L	9 16 49.8	27.1	
	10.0	218 10 53.9	+0 20 22.6	16 04.82	59 01.04	-20.49	21.1	U	10 05 16.9	27.2	
	10.5	225 07 36.1	0 56 57.0	15 59.07	58 39.94	21.10		L	10 17 44.1	27.1	
	11.0	231 59 21.9	1 32 15.8	15 53.27	58 18.63	21.31	22.1	U	11 06 11.2	27.2	
	11.5	238 46 22.6	2 05 51.3	15 47.50	57 57.47	21.16		L	11 18 38.4	27.1	
	12.0	245 28 52.4	+2 37 19.0	15 41.85	57 36.72	20.75	23.1	U	12 07 05.5	26.9	
	12.5	252 07 07.4	3 06 17.5	15 36.37	57 16.59	-20.13		L	12 19 32.4	26.7	
	13.0	258 41 24.3	3 32 28.6	15 31.10	56 57.26	19.33	24.1	U	13 07 59.1	26.3	
	13.5	265 11 59.9	3 55 37.4	15 26.07	56 38.81	18.45		L	13 20 25.4	26.0	
	14.0	271 39 09.6	4 15 31.6	15 21.31	56 21.32	17.49	25.1	U	14 08 51.4	25.5	
	14.5	278 03 07.7	+4 32 01.7	15 16.81	56 04.82	16.50		L	14 21 16.9	25.0	
	15.0	284 24 06.8	+4 45 00.7	15 12.59	55 49.31	-15.51	26.1	U	15 09 41.9		

UNIVERSAL TIME

Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich			
		° ' "	° ' "	' "	' " "	d	U	d	h	m
Feb.	15.0	284 24 06.8	+4 45 00.7	15 12.59	55 49.31 -14.51	26.1	U	15	09	41.9 24.5
	15.5	290 42 17.6	4 54 24.1	15 08.63	55 34.80 13.55		L	15	22	06.4 24.0
	16.0	296 57 49.1	5 00 10.1	15 04.94	55 21.25 12.60	27.1	U	16	10	30.4 23.4
	16.5	303 10 48.9	5 02 18.9	15 01.51	55 08.65 11.65		L	16	22	53.8 22.9
	17.0	309 21 23.4	5 00 53.2	14 58.33	54 57.00 10.71	28.1	U	17	11	16.7 22.5
	17.5	315 29 38.3	+4 55 57.8	14 55.42	54 46.29 -9.75		L	17	23	39.2 22.1
	18.0	321 35 39.0	4 47 39.7	14 52.76	54 36.54 8.77	29.1	..	..	..	..
	18.5	327 39 31.1	4 36 07.7	14 50.37	54 27.77 7.74		U	18	12	01.3 21.7
	19.0	333 41 21.3	4 21 32.2	14 48.26	54 20.03 6.63	0.3	L	19	00	23.0 21.4
	19.5	339 41 17.6	4 04 05.2	14 46.45	54 13.40 5.45		U	19	12	44.4 21.2
	20.0	345 39 29.4	+3 44 00.0	14 44.97	54 07.95 -4.16	1.3	L	20	01	05.6 21.1
	20.5	351 36 08.6	3 21 30.9	14 43.84	54 03.79 2.77		U	20	13	26.7 20.9
	21.0	357 31 29.5	2 56 53.1	14 43.08	54 01.02 -1.24	2.3	L	21	01	47.6 21.0
	21.5	3 25 49.3	2 30 22.5	14 42.74	53 59.78 +0.42		U	21	14	08.6 21.1
	22.0	9 19 27.8	2 02 15.3	14 42.86	54 00.20 2.19	3.3	L	22	02	29.7 21.3
	22.5	15 12 48.0	+1 32 48.2	14 43.46	54 02.39 +4.12		U	22	14	51.0 21.5
	23.0	21 06 15.9	1 02 18.1	14 44.58	54 06.51 6.15	4.3	L	23	03	12.5 21.8
	23.5	27 00 20.3	+0 31 02.3	14 46.25	54 12.66 8.30		U	23	15	34.3 22.2
	24.0	32 55 32.7	-0 00 41.9	14 48.51	54 20.96 10.54	5.3	L	24	03	56.5 22.7
	24.5	38 52 27.2	0 32 36.6	14 51.38	54 31.50 12.84		U	24	16	19.2 23.2
	25.0	44 51 40.2	-1 04 23.7	14 54.88	54 44.34 +15.19	6.3	L	25	04	42.4 23.7
Mar.	25.5	50 53 49.6	1 35 44.2	14 59.02	54 59.53 17.53		U	25	17	06.1 24.2
	26.0	56 59 34.4	2 06 18.7	15 03.80	55 17.06 19.84	7.3	L	26	05	30.3 24.9
	26.5	63 09 34.2	2 35 46.8	15 09.21	55 36.90 22.04		U	26	17	55.2 25.4
	27.0	69 24 28.2	3 03 47.0	15 15.21	55 58.94 24.09	8.3	L	27	06	20.6 26.1
	27.5	75 44 53.9	-3 29 56.7	15 21.77	56 23.03 +25.92		U	27	18	46.7 26.5
	28.0	82 11 26.5	3 53 52.4	15 28.83	56 48.95 27.42	9.3	L	28	07	13.2 27.0
	28.5	88 44 36.9	4 15 09.3	15 36.30	57 16.37 28.55		U	28	19	40.2 27.3
	1.0	95 24 50.3	4 33 22.1	15 44.08	57 44.92 29.19	10.3	L	1	08	07.5 27.7
	1.5	102 12 24.9	4 48 05.6	15 52.04	58 14.11 29.30		U	1	20	35.2 27.8
	2.0	109 07 29.7	-4 58 54.7	16 00.02	58 43.41 +28.77	11.3	L	2	09	03.0 28.0
	2.5	116 10 03.1	5 05 26.2	16 07.86	59 12.18 27.55		U	2	21	31.0 28.0
	3.0	123 19 51.6	5 07 19.9	16 15.36	59 39.73 25.60	12.3	L	3	09	59.0 28.1
	3.5	130 36 28.8	5 04 19.7	16 22.34	60 05.33 22.92		U	3	22	27.1 28.0
	4.0	137 59 15.3	4 56 15.3	16 28.58	60 28.25 19.54	13.3	L	4	10	55.1 27.9
	4.5	145 27 18.9	-4 43 03.6	16 33.91	60 47.79 +15.53		U	4	23	23.0 27.9
	5.0	152 59 36.3	4 24 49.9	16 38.14	61 03.32 11.02	14.3	L	5	11	50.9 27.9
	5.5	160 34 55.1	4 01 48.4	16 41.14	61 14.34 6.16		..	..	..	..
	6.0	168 11 57.1	3 34 22.4	16 42.82	61 20.50 +1.11	15.3	U	6	00	18.8 27.9
	6.5	175 49 21.5	3 03 03.5	16 43.12	61 21.61 -3.91		L	6	12	46.7 27.9
	7.0	183 25 48.8	-2 28 30.3	16 42.05	61 17.70 -8.73	16.3	U	7	01	14.6 28.0
	7.5	191 00 04.1	1 51 26.7	16 39.68	61 08.97 13.16		L	7	13	42.6 28.0
	8.0	198 30 59.7	1 12 39.7	16 36.10	60 55.81 17.09	17.3	U	8	02	10.6 28.1
	8.5	205 57 38.1	-0 32 57.2	16 31.43	60 38.72 20.41		L	8	14	38.7 28.2
	9.0	213 19 12.6	+0 06 54.0	16 25.87	60 18.31 23.04	18.3	U	9	03	06.9 28.2
	9.5	220 35 08.1	+0 46 10.0	16 19.60	59 55.27 -24.98		L	9	15	35.1 28.2
	10.0	227 45 01.3	+1 24 11.0	16 12.79	59 30.29	19.3	U	10	04	03.3

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Date	Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich
	° ' "	° ' "	' "	' " "	d	d h m m
Mar. 10.0	227 45 01.3	+1 24 11.0	16 12.79	59 30.29	19.3	U 10 04 03.3 28.1
10.5	234 48 39.1	2 00 22.2	16 05.64	59 04.04		L 10 16 31.4 28.0
11.0	241 45 58.4	2 34 14.0	15 58.32	58 37.16	20.3	U 11 04 59.4 27.7
11.5	248 37 03.8	3 05 21.8	15 50.97	58 10.19		L 11 17 27.1 27.4
12.0	255 22 06.7	3 33 26.1	15 43.74	57 43.64	21.3	U 12 05 54.5 27.0
12.5	262 01 23.6	+3 58 12.0	15 36.73	57 17.92		L 12 18 21.5 26.5
13.0	268 35 14.5	4 19 28.3	15 30.03	56 53.34	22.3	U 13 06 48.0 25.9
13.5	275 04 01.9	4 37 07.6	15 23.71	56 30.14		L 13 19 13.9 25.4
14.0	281 28 09.7	4 51 05.2	15 17.82	56 08.50	23.3	U 14 07 39.3 24.7
14.5	287 48 02.1	5 01 19.1	15 12.38	55 48.55		L 14 20 04.0 24.2
15.0	294 04 03.1	+5 07 49.4	15 07.42	55 30.34	24.3	U 15 08 28.2 23.6
15.5	300 16 36.1	5 10 38.2	15 02.94	55 13.90		L 15 20 51.8 23.0
16.0	306 26 03.2	5 09 49.4	14 58.93	54 59.20	25.3	U 16 09 14.8 22.6
16.5	312 32 45.0	5 05 28.3	14 55.39	54 46.21		L 16 21 37.4 22.2
17.0	318 37 00.9	4 57 41.7	14 52.31	54 34.87	26.3	U 17 09 59.6 21.7
17.5	324 39 08.6	+4 46 38.1	14 49.65	54 25.12		L 17 22 21.3 21.5
18.0	330 39 24.5	4 32 27.0	14 47.41	54 16.89	27.3	U 18 10 42.8 21.3
18.5	336 38 03.9	4 15 19.5	14 45.56	54 10.11		L 18 23 04.1 21.0
19.0	342 35 21.1	3 55 27.7	14 44.09	54 04.72	28.3	U 19 11 25.1 21.1
19.5	348 31 29.8	3 33 05.1	14 42.99	54 00.67		L 19 23 46.2 21.0
20.0	354 26 43.7	+3 08 26.3	14 42.24	53 57.92	29.3	.. .. .
20.5	0 21 16.2	2 41 46.8	14 41.84	53 56.47		U 20 12 07.2 21.0
21.0	6 15 21.4	2 13 23.0	14 41.80	53 56.31	0.6	L 21 00 28.2 21.2
21.5	12 09 13.9	1 43 32.3	14 42.11	53 57.46		U 21 12 49.4 21.4
22.0	18 03 09.9	1 12 32.5	14 42.79	53 59.96	1.6	L 22 01 10.8 21.7
22.5	23 57 26.5	+0 40 41.9	14 43.86	54 03.86		U 22 13 32.5 22.0
23.0	29 52 22.6	+0 08 19.4	14 45.32	54 09.23	2.6	L 23 01 54.5 22.3
23.5	35 48 19.0	-0 24 15.9	14 47.20	54 16.14		U 23 14 16.8 22.8
24.0	41 45 38.2	0 56 44.6	14 49.53	54 24.67	3.6	L 24 02 39.6 23.2
24.5	47 44 44.8	1 28 46.9	14 52.31	54 34.90		U 24 15 02.8 23.6
25.0	53 46 05.2	-2 00 03.1	14 55.58	54 46.91	4.6	L 25 03 26.4 24.2
25.5	59 50 07.6	2 30 13.0	14 59.36	55 00.76		U 25 15 50.6 24.6
26.0	65 57 21.5	2 58 56.3	15 03.65	55 16.51	5.6	L 26 04 15.2 25.1
26.5	72 08 17.8	3 25 52.4	15 08.46	55 34.18		U 26 16 40.3 25.4
27.0	78 23 27.6	3 50 40.4	15 13.79	55 53.75	6.6	L 27 05 05.7 25.9
27.5	84 43 22.1	-4 12 59.1	15 19.63	56 15.17		U 27 17 31.6 26.2
28.0	91 08 31.5	4 32 27.1	15 25.94	56 38.34	7.6	L 28 05 57.8 26.4
28.5	97 39 24.2	4 48 42.9	15 32.68	57 03.08		U 28 18 24.2 26.7
29.0	104 16 25.3	5 01 25.4	15 39.79	57 29.17	8.6	L 29 06 50.9 26.8
29.5	110 59 55.6	5 10 14.2	15 47.18	57 56.30		U 29 19 17.7 26.9
30.0	117 50 10.3	-5 14 50.1	15 54.74	58 24.05	9.6	L 30 07 44.6 27.1
30.5	124 47 17.0	5 14 56.2	16 02.34	58 51.95		U 30 20 11.7 27.1
31.0	131 51 14.8	5 10 18.5	16 09.83	59 19.44	10.6	L 31 08 38.8 27.1
31.5	139 01 52.7	5 00 47.5	16 17.04	59 45.87		U 31 21 05.9 27.3
Apr. 1.0	146 18 49.1	4 46 19.2	16 23.77	60 10.57	11.6	L 1 09 33.2 27.4
1.5	153 41 30.7	-4 26 56.2	16 29.83	60 32.83		U 1 22 00.6 27.5
2.0	161 09 13.1	-4 02 49.1	16 35.04	60 51.94	12.6	L 2 10 28.1

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Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich				
		° ' "	° ' "	' "	' " "	d	L	d	h	m	m
Apr.	1.0	146 18 49.1	-4 46 19.2	16 23.77	60 10.57	+22.26	11.6	L	1 09 33.2		27.4
	1.5	153 41 30.7	4 26 56.2	16 29.83	60 32.83	19.11		U	1 22 00.6		27.5
	2.0	161 09 13.1	4 02 49.1	16 35.04	60 51.94	15.30	12.6	L	2 10 28.1		27.7
	2.5	168 41 01.3	3 34 16.6	16 39.21	61 07.24	10.94		U	2 22 55.8		28.0
	3.0	176 15 51.4	3 01 46.0	16 42.19	61 18.18	6.15	13.6	L	3 11 23.8		28.1
	3.5	183 52 32.6	-2 25 52.7	16 43.86	61 24.33	+1.09		U	3 23 51.9		28.5
	4.0	191 29 50.0	1 47 18.8	16 44.16	61 25.42	-4.05	14.6	..	..	..	..
	4.5	199 06 27.5	1 06 52.0	16 43.06	61 21.37	9.05		L	4 12 20.4		28.7
	5.0	206 41 11.0	-0 25 22.6	16 40.59	61 12.32	13.75	15.6	U	5 00 49.1		29.0
	5.5	214 12 51.1	+0 16 18.1	16 36.84	60 58.57	17.97		L	5 13 18.1		29.1
	6.0	221 40 25.8	+0 57 20.5	16 31.95	60 40.60	-21.60	16.6	U	6 01 47.2		29.3
	6.5	229 03 02.1	1 36 58.5	16 26.06	60 19.00	24.54		L	6 14 16.5		29.2
	7.0	236 19 57.1	2 14 31.2	16 19.38	59 54.46	26.74	17.6	U	7 02 45.7		29.0
	7.5	243 30 39.0	2 49 23.7	16 12.09	59 27.72	28.23		L	7 15 14.7		28.8
	8.0	250 34 46.6	3 21 07.8	16 04.40	58 59.49	29.02	18.6	U	8 03 43.5		28.4
	8.5	257 32 09.1	+3 49 21.9	15 56.49	58 30.47	-29.15		L	8 16 11.9		27.8
	9.0	264 22 44.9	4 13 50.3	15 48.55	58 01.32	28.71	19.6	U	9 04 39.7		27.2
	9.5	271 06 40.5	4 34 23.0	15 40.73	57 32.61	27.79		L	9 17 06.9		26.5
	10.0	277 44 09.6	4 50 54.8	15 33.16	57 04.82	26.46	20.6	U	10 05 33.4		25.8
	10.5	284 15 31.1	5 03 24.3	15 25.95	56 38.36	24.82		L	10 17 59.2		25.0
	11.0	290 41 08.5	+5 11 53.3	15 19.19	56 13.54	-22.93	21.6	U	11 06 24.2		24.3
	11.5	297 01 28.3	5 16 25.9	15 12.94	55 50.61	20.88		L	11 18 48.5		23.7
	12.0	303 16 59.5	5 17 08.6	15 07.25	55 29.73	18.70	22.6	U	12 07 12.2		23.1
	12.5	309 28 11.8	5 14 09.0	15 02.15	55 11.03	16.49		L	12 19 35.3		22.5
	13.0	315 35 35.9	5 07 35.9	14 57.66	54 54.54	14.25	23.6	U	13 07 57.8		22.0
	13.5	321 39 42.1	+4 57 39.2	14 53.78	54 40.29	-12.04		L	13 20 19.8		21.6
	14.0	327 41 00.2	4 44 29.5	14 50.50	54 28.25	9.90	24.6	U	14 08 41.4		21.4
	14.5	333 39 59.1	4 28 18.3	14 47.80	54 18.35	7.84		L	14 21 02.8		21.1
	15.0	339 37 06.1	4 09 17.5	14 45.67	54 10.51	5.88	25.6	U	15 09 23.9		21.0
	15.5	345 32 47.4	3 47 40.2	14 44.07	54 04.63	4.00		L	15 21 44.9		21.0
	16.0	351 27 27.3	+3 23 40.0	14 42.98	54 00.63	-2.27	26.6	U	16 10 05.9		21.0
	16.5	357 21 28.9	2 57 31.4	14 42.36	53 58.36	-0.62		L	16 22 26.9		21.1
	17.0	3 15 13.6	2 29 29.9	14 42.19	53 57.74	+0.91	27.6	U	17 10 48.0		21.3
	17.5	9 09 01.3	1 59 51.7	14 42.44	53 58.65	2.35		L	17 23 09.3		21.5
	18.0	15 03 10.6	1 28 54.2	14 43.08	54 01.00	3.70	28.6	U	18 11 30.8		21.9
	18.5	20 57 59.3	+0 56 55.5	14 44.08	54 04.70	+4.96		L	18 23 52.7		22.2
	19.0	26 53 43.8	+0 24 14.4	14 45.44	54 09.66	6.18	29.6	..	..	..	..
	19.5	32 50 39.9	-0 08 49.4	14 47.12	54 15.84	7.36		U	19 12 14.9		22.6
	20.0	38 49 03.4	0 41 55.5	14 49.13	54 23.20	8.52	0.9	L	20 00 37.5		23.1
	20.5	44 49 09.4	1 14 43.3	14 51.45	54 31.72	9.66		U	20 13 00.6		23.5
	21.0	50 51 13.4	-1 46 51.6	14 54.08	54 41.38	+10.81	1.9	L	21 01 24.1		23.9
	21.5	56 55 30.9	2 17 58.9	14 57.02	54 52.19	11.98		U	21 13 48.0		24.4
	22.0	63 02 17.9	2 47 44.0	15 00.29	55 04 17	13.17	2.9	L	22 02 12.4		24.8
	22.5	69 11 50.9	3 15 45.6	15 03.88	55 17.34	14.39		U	22 14 37.2		25.2
	23.0	75 24 26.9	3 41 42.5	15 07.80	55 31.73	15.63	3.9	L	23 03 02.4		25.5
	23.5	81 40 23.6	-4 05 14.1	15 12.06	55 47.36	+16.89		U	23 15 27.9		25.7
	24.0	87 59 59.1	-4 26 00.2	15 16.66	56 04.25		4.9	L	24 03 53.6		

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Date	Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich
	° ' "	° ' "	' "	' " "	d	d h m m
Apr. 24.0	87 59 59.1	-4 26 00.2	15 16.66	56 04.25	4.9	L 24 03 53.6 ^m
24.5	94 23 31.5	4 43 41.6	15 21.60	56 22.38 ^{+18.13}		U 24 16 19.5 ^{25.9}
25.0	100 51 18.9	4 57 59.6	15 26.86	56 41.71 ^{19.33}	5.9	L 25 04 45.5 ^{26.0}
25.5	107 23 38.6	5 08 36.9	15 32.44	57 02.18 ^{20.47}		U 25 17 11.6 ^{26.1}
26.0	114 00 46.8	5 15 17.7	15 38.29	57 23.67 ^{21.49}	6.9	L 26 05 37.7 ^{26.1}
				22.34		26.1
26.5	120 42 57.7	-5 17 47.8	15 44.38	57 46.01 ^{+22.95}		U 26 18 03.8 ^{26.1}
27.0	127 30 22.8	5 15 55.6	15 50.63	58 08.96 ^{23.26}	7.9	L 27 06 29.9 ^{26.1}
27.5	134 23 09.8	5 09 32.1	15 56.97	58 32.22 ^{23.21}		U 27 18 56.0 ^{26.1}
28.0	141 21 21.8	4 58 32.2	16 03.29	58 55.43 ^{22.72}	8.9	L 28 07 22.1 ^{26.3}
28.5	148 24 56.0	4 42 54.9	16 09.48	59 18.15 ^{21.73}		U 28 19 48.4 ^{26.3}
29.0	155 33 43.2	-4 22 44.5	16 15.40	59 39.88 ^{+20.21}	9.9	L 29 08 14.7 ^{26.6}
29.5	162 47 26.7	3 58 10.9	16 20.91	60 00.09 ^{18.10}		U 29 20 41.3 ^{26.8}
30.0	170 05 41.8	3 29 30.6	16 25.84	60 18.19 ^{15.41}	10.9	L 30 09 08.1 ^{27.1}
30.5	177 27 55.8	2 57 06.8	16 30.04	60 33.60 ^{12.19}		U 30 21 35.2 ^{27.6}
May 1.0	184 53 27.8	2 21 29.7	16 33.36	60 45.79 ^{8.47}	11.9	L 1 10 02.8 ^{27.9}
1.5	192 21 29.5	-1 43 15.8	16 35.67	60 54.26 ^{+4.35}		U 1 22 30.7 ^{28.4}
2.0	199 51 06.2	1 03 07.3	16 36.85	60 58.61 ^{-0.02}	12.9	L 2 10 59.1 ^{28.9}
2.5	207 21 18.4	-0 21 50.4	16 36.85	60 58.59 ^{4.51}		U 2 23 28.0 ^{29.2}
3.0	214 51 03.7	+0 19 46.1	16 35.62	60 54.08 ^{8.94}	13.9	L 3 11 57.2 ^{29.5}
3.5	222 19 18.9	1 00 53.0	16 33.18	60 45.14 ^{13.18}		 ^{...}
4.0	229 45 02.3	+1 40 42.7	16 29.59	60 31.96 ^{-17.05}	14.9	U 4 00 26.7 ^{29.6}
4.5	237 07 16.0	2 18 31.3	16 24.95	60 14.91 ^{20.44}		L 4 12 56.3 ^{29.7}
5.0	244 25 07.6	2 53 39.8	16 19.38	59 54.47 ^{23.25}	15.9	U 5 01 26.0 ^{29.5}
5.5	251 37 52.1	3 25 35.4	16 13.05	59 31.22 ^{25.42}		L 5 13 55.5 ^{29.2}
6.0	258 44 53.4	3 53 52.3	16 06.12	59 05.80 ^{26.94}	16.9	U 6 02 24.7 ^{28.7}
6.5	265 45 44.2	+4 18 11.3	15 58.78	58 38.86 ^{-27.79}		L 6 14 53.4 ^{28.0}
7.0	272 40 07.0	4 38 20.3	15 51.21	58 11.07 ^{28.03}	17.9	U 7 03 21.4 ^{27.3}
7.5	279 27 53.5	4 54 12.9	15 43.57	57 43.04 ^{27.69}		L 7 15 48.7 ^{26.5}
8.0	286 09 04.3	5 05 48.0	15 36.03	57 15.35 ^{26.85}	18.9	U 8 04 15.2 ^{25.7}
8.5	292 43 47.7	5 13 08.8	15 28.71	56 48.50 ^{25.56}		L 8 16 40.9 ^{24.9}
9.0	299 12 19.2	+5 16 21.8	15 21.75	56 22.94 ^{-23.93}	19.9	U 9 05 05.8 ^{24.1}
9.5	305 35 00.0	5 15 36.1	15 15.23	55 59.01 ^{21.99}		L 9 17 29.9 ^{23.4}
10.0	311 52 16.1	5 11 02.6	15 09.24	55 37.02 ^{19.84}	20.9	U 10 05 53.3 ^{22.8}
10.5	318 04 37.2	5 02 53.4	15 03.83	55 17.18 ^{17.53}		L 10 18 16.1 ^{22.2}
11.0	324 12 35.7	4 51 21.4	14 59.06	54 59.65 ^{15.11}	21.9	U 11 06 38.3 ^{21.8}
11.5	330 16 46.0	+4 36 40.1	14 54.94	54 44.54 ^{-12.66}		L 11 19 00.1 ^{21.4}
12.0	336 17 43.4	4 19 03.1	14 51.49	54 31.88 ^{10.19}	22.9	U 12 07 21.5 ^{21.2}
12.5	342 16 03.6	3 58 44.6	14 48.71	54 21.69 ^{7.75}		L 12 19 42.7 ^{21.0}
13.0	348 12 22.1	3 35 58.5	14 46.60	54 13.94 ^{5.37}	23.9	U 13 08 03.7 ^{21.0}
13.5	354 07 13.7	3 10 59.5	14 45.14	54 08.57 ^{3.09}		L 13 20 24.7 ^{21.0}
14.0	0 01 11.9	+2 44 02.5	14 44.30	54 05.48 ^{-0.92}	24.9	U 14 08 45.7 ^{21.2}
14.5	5 54 49.0	2 15 22.7	14 44.05	54 04.56 ^{+1.12}		L 14 21 06.9 ^{21.3}
15.0	11 48 35.3	1 45 16.2	14 44.35	54 05.68 ^{3.01}	25.9	U 15 09 28.2 ^{21.6}
15.5	17 42 59.2	1 13 59.7	14 45.17	54 08.69 ^{4.75}		L 15 21 49.8 ^{22.0}
16.0	23 38 27.0	0 41 50.8	14 46.47	54 13.44 ^{6.34}	26.9	U 16 10 11.8 ^{22.4}
16.5	29 35 22.5	+0 09 07.9	14 48.19	54 19.78 ^{+7.76}		L 16 22 34.2 ^{22.9}
17.0	35 34 07.2	-0 23 49.5	14 50.31	54 27.54	27.9	U 17 10 57.1

MOON, 1958
UNIVERSAL TIME

Date		Longitude	Latitude		Semi-diameter	Horizontal Parallax		Age	Transit, Meridian of Greenwich				
		° ' "	° ' "	' "	' "	' "	"	d	d	h	m	m	
May	17.0	35 34 07.2	-0 23 49.5	14 50.31	54 27.54	+ 9.03		27.9	U	17 10	57.1	23.4	
	17.5	41 35 00.2	0 56 41.1	14 52.77	54 36.57	10.14			L	17 23	20.5	23.8	
	18.0	47 38 18.1	1 29 05.7	14 55.53	54 46.71	11.12		28.9	U	18 11	44.3	24.4	
	18.5	53 44 14.8	2 00 41.5	14 58.56	54 57.83	11.96							
	19.0	59 53 02.4	2 31 06.2	15 01.82	55 09.79	12.69		0.2	L	19 00	08.7	24.8	
	19.5	66 04 50.6	-2 59 57.2	15 05.28	55 22.48	+13.33			U	19 12	33.5	25.2	
	20.0	72 19 47.1	3 26 52.0	15 08.91	55 35.81	13.88		1.2	L	20 00	58.7	25.6	
	20.5	78 37 58.1	3 51 28.4	15 12.69	55 49.69	14.37			U	20 13	24.3	25.9	
	21.0	84 59 28.1	4 13 25.1	15 16.60	56 04.06	14.81		2.2	L	21 01	50.2	26.0	
	21.5	91 24 20.6	4 32 21.7	15 20.64	56 18.87	15.22			U	21 14	16.2	26.1	
	22.0	97 52 38.1	-4 47 59.4	15 24.79	56 34.09	+15.60		3.2	L	22 02	42.3	26.2	
	22.5	104 24 22.5	5 00 01.1	15 29.04	56 49.69	15.93			U	22 15	08.5	26.1	
	23.0	110 59 35.5	5 08 12.0	15 33.38	57 05.62	16.24		4.2	L	23 03	34.6	26.0	
	23.5	117 38 18.1	5 12 19.8	15 37.80	57 21.86	16.48			U	23 16	00.6	25.9	
	24.0	124 20 31.2	5 12 14.8	15 42.29	57 38.34	16.66		5.2	L	24 04	26.5	25.7	
	24.5	131 06 15.7	-5 07 50.7	15 46.83	57 55.00	+16.73			U	24 16	52.2	25.7	
	25.0	137 55 31.8	4 59 04.3	15 51.39	58 11.73	16.96		6.2	L	25 05	17.9	25.6	
	25.5	144 48 19.0	4 45 56.5	15 55.93	58 28.39	16.40			U	25 17	43.5	25.5	
	26.0	151 44 35.7	4 28 32.0	16 00.40	58 44.79	15.93		7.2	L	26 06	09.0	25.6	
	26.5	158 44 18.8	4 06 59.9	16 04.74	59 00.72	15.19			U	26 18	34.6	25.7	
	27.0	165 47 22.7	-3 41 33.8	16 08.87	59 15.91	+14.12		8.2	L	27 07	00.3	25.9	
	27.5	172 53 38.9	3 12 32.1	16 12.72	59 30.03	12.72			U	27 19	26.2	26.2	
	28.0	180 02 55.3	2 40 18.2	16 16.19	59 42.75	10.95		9.2	L	28 07	52.4	26.6	
	28.5	187 14 55.6	2 05 20.2	16 19.17	59 53.70	8.80			U	28 20	19.0	27.1	
	29.0	194 29 18.6	1 28 10.7	16 21.57	60 02.50	6.30		10.2	L	29 08	46.1	27.5	
	29.5	201 45 37.9	-0 49 26.7	16 23.28	60 08.80	+ 3.48			U	29 21	13.6	28.0	
	30.0	209 03 21.8	-0 09 48.1	16 24.23	60 12.28	+ 0.40		11.2	L	30 09	41.6	28.5	
	30.5	216 21 53.8	+0 30 02.7	16 24.34	60 12.68	- 2.89			U	30 22	10.1	29.0	
	31.0	223 40 32.7	1 09 22.3	16 23.55	60 09.79	6.26		12.2	L	31 10	39.1	29.2	
	31.5	230 58 33.8	1 47 27.7	16 21.85	60 03.53	9.60			U	31 23	08.3	29.5	
June	1.0	238 15 10.2	+2 23 37.9	16 19.23	59 53.93	-12.82		13.2	L	1 11	37.8	29.4	
	1.5	245 29 34.1	2 57 15.5	16 15.74	59 41.11	15.79							
	2.0	252 40 58.8	3 27 47.4	16 11.44	59 25.32	18.45		14.2	U	2 00	07.2	29.4	
	2.5	259 48 40.3	3 54 46.2	16 06.41	59 06.87	20.67			L	2 12	36.6	28.9	
	3.0	266 51 58.8	4 17 50.8	16 00.78	58 46.20	22.43		15.2	U	3 01	05.5	28.5	
	3.5	273 50 20.4	+4 36 46.3	15 54.67	58 23.77	-23.67			L	3 13	34.0	27.8	
	4.0	280 43 18.0	4 51 24.2	15 48.22	58 00.10	24.39		16.2	U	4 02	01.8	27.0	
	4.5	287 30 32.3	5 01 41.6	15 41.57	57 35.71	24.60			L	4 14	28.8	26.3	
	5.0	294 11 52.0	5 07 40.7	15 34.87	57 11.11	24.30		17.2	U	5 02	55.1	25.4	
	5.5	300 47 13.9	5 09 27.9	15 28.25	56 46.81	23.56			L	5 15	20.5	24.7	
	6.0	307 16 42.6	+5 07 13.1	15 21.83	56 23.25	-22.40		18.2	U	6 03	45.2	23.8	
	6.5	313 40 29.7	5 01 08.5	15 15.73	56 00.85	20.88			L	6 16	09.0	23.2	
	7.0	319 58 53.3	4 51 28.3	15 10.04	55 39.97	19.07		19.2	U	7 04	32.2	22.6	
	7.5	326 12 17.1	4 38 27.6	15 04.84	55 20.90	17.00			L	7 16	54.8	22.1	
	8.0	332 21 09.5	4 22 22.3	15 00.21	55 03.90	14.75		20.2	U	8 05	16.9	21.7	
	8.5	338 26 02.6	+4 03 28.4	14 56.20	54 49.15	-12.34			L	8 17	38.6	21.4	
	9.0	344 27 31.4	+3 42 02.0	14 52.84	54 36.81			21.2	U	9 06	00.0		

UNIVERSAL TIME

Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich			
		° ' "	° ' "	"	" "	d	d	h	m	m
June	9.0	344 27 31.4	+3 42 02.0	14 52.84	54 36.81	- 9.83	21.2	U	9 06 00.0	21.1
	9.5	350 26 13.2	3 18 19.2	14 50.16	54 26.98	7.29		L	9 18 21.1	21.1
	10.0	356 22 46.4	2 52 35.7	14 48.17	54 19.69	4.72	22.2	U	10 06 42.2	21.1
	10.5	2 17 50.1	2 25 07.3	14 46.88	54 14.97	- 2.18		L	10 19 03.3	21.2
	11.0	8 12 03.6	1 56 10.0	14 46.29	54 12.79	+ 0.30	23.2	U	11 07 24.5	21.4
	11.5	14 06 05.8	+1 25 59.8	14 46.37	54 13.09	+ 2.67		L	11 19 45.9	21.6
	12.0	20 00 34.2	0 54 53.0	14 47.10	54 15.76	4.93	24.2	U	12 08 07.5	22.1
	12.5	25 56 05.0	+0 23 06.5	14 48.44	54 20.69	7.05		L	12 20 29.6	22.4
	13.0	31 53 12.3	-0 09 02.0	14 50.36	54 27.74	8.98	25.2	U	13 08 52.0	23.0
	13.5	37 52 27.8	0 41 14.0	14 52.81	54 36.72	10.72		L	13 21 15.0	23.5
	14.0	43 54 20.2	-1 13 10.1	14 55.73	54 47.44	+12.23	26.2	U	14 09 38.5	24.0
	14.5	49 59 15.0	1 44 29.8	14 59.06	54 59.67	13.53		L	14 22 02.5	24.6
	15.0	56 07 33.7	2 14 51.8	15 02.75	55 13.20	14.58	27.2	U	15 10 27.1	25.1
	15.5	62 19 34.0	2 43 53.9	15 06.72	55 27.78	15.38		L	15 22 52.2	25.6
	16.0	68 35 29.0	3 11 13.2	15 10.91	55 43.16	15.94	28.2	U	16 11 17.8	26.0
	16.5	74 55 27.3	-3 36 26.8	15 15.25	55 59.10	+16.26		L	16 23 43.8	26.3
	17.0	81 19 33.3	3 59 11.7	15 19.68	56 15.36	16.35	29.2	..	.. .. .	..
	17.5	87 47 46.3	4 19 05.6	15 24.14	56 31.71	16.23		U	17 12 10.1	26.5
	18.0	94 20 01.7	4 35 47.3	15 28.56	56 47.94	15.92	0.7	L	18 00 36.6	26.7
	18.5	100 56 10.9	4 48 57.7	15 32.90	57 03.86	15.47		U	18 13 03.3	26.6
	19.0	107 36 02.0	-4 58 19.7	15 37.11	57 19.33	+14.87	1.7	L	19 01 29.9	26.6
	19.5	114 19 20.4	5 03 39.5	15 41.16	57 34.20	14.17		U	19 13 56.5	26.5
	20.0	121 05 49.7	5 04 46.8	15 45.02	57 48.37	13.39	2.7	L	20 02 23.0	26.2
	20.5	127 55 12.4	5 01 35.0	15 48.67	58 01.76	12.57		U	20 14 49.2	26.0
	21.0	134 47 10.7	4 54 01.9	15 52.09	58 14.33	11.70	3.7	L	21 03 15.2	25.8
	21.5	141 41 27.4	-4 42 09.7	15 55.28	58 26.03	+10.81		U	21 15 41.0	25.7
	22.0	148 37 46.4	4 26 05.1	15 58.23	58 36.84	9.90	4.7	L	22 04 06.7	25.5
	22.5	155 35 53.1	4 05 59.3	16 00.93	58 46.74	8.97		U	22 16 32.2	25.5
	23.0	162 35 34.8	3 42 07.7	16 03.37	58 55.71	7.99	5.7	L	23 04 57.7	25.5
	23.5	169 36 40.3	3 14 50.1	16 05.55	59 03.70	6.98		U	23 17 23.2	25.6
	24.0	176 39 00.1	-2 44 29.8	16 07.45	59 10.68	+ 5.89	6.7	L	24 05 48.8	25.8
	24.5	183 42 25.6	2 11 33.6	16 09.05	59 16.57	4.69		U	24 18 14.6	26.0
	25.0	190 46 48.7	1 36 31.7	16 10.33	59 21.26	3.40	7.7	L	25 06 40.6	26.4
	25.5	197 52 00.9	0 59 56.6	16 11.26	59 24.66	1.97		U	25 19 07.0	26.9
	26.0	204 57 52.7	-0 22 23.1	16 11.79	59 26.63	+ 0.40	8.7	L	26 07 33.9	27.2
	26.5	212 04 12.5	+0 15 32.6	16 11.90	59 27.03	- 1.33		U	26 20 01.1	27.7
	27.0	219 10 46.2	0 53 13.3	16 11.54	59 25.70	3.17	9.7	L	27 08 28.8	28.1
	27.5	226 17 16.6	1 30 01.8	16 10.68	59 22.53	5.12		U	27 20 56.9	28.5
	28.0	233 23 22.9	2 05 22.0	16 09.28	59 17.41	7.17	10.7	L	28 09 25.4	28.7
	28.5	240 28 41.1	2 38 39.2	16 07.33	59 10.24	9.23		U	28 21 54.1	28.7
	29.0	247 32 44.1	+3 09 21.2	16 04.81	59 01.01	-11.26	11.7	L	29 10 22.8	28.8
	29.5	254 35 02.2	3 36 59.8	16 01.74	58 49.75	13.23		U	29 22 51.6	28.5
	30.0	261 35 04.2	4 01 10.6	15 58.14	58 36.52	15.04	12.7	L	30 11 20.1	28.2
	30.5	268 32 18.4	4 21 34.3	15 54.04	58 21.48	16.65		U	30 23 48.3	27.6
July	1.0	275 26 14.1	4 37 56.7	15 49.51	58 04.83	18.01	13.7	..	.. .. .	..
	1.5	282 16 22.7	+4 50 08.9	15 44.60	57 46.82	-19.06		L	1 12 15.9	27.1
	2.0	289 02 18.9	+4 58 07.2	15 39.41	57 27.76		14.7	U	2 00 43.0	

UNIVERSAL TIME

Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich				
		° ' "	° ' "	' "	' "	d	d	h	m	m	
July	1.0	275 26 14.1	+4 37 56.7	15 49.51	58 04.83	-18.01	13.7	..	..	..	
	1.5	282 16 22.7	4 50 08.9	15 44.60	57 46.82	19.06		L	1 12 15.9	27.1	
	2.0	289 02 18.9	4 58 07.2	15 39.41	57 27.76	19.77	14.7	U	2 00 43.0	26.3	
	2.5	295 43 42.1	5 01 52.8	15 34.02	57 07.99	20.13		L	2 13 09.3	25.6	
	3.0	302 20 17.0	5 01 31.3	15 28.54	56 47.86	20.12	15.7	U	3 01 34.9	24.9	
	3.5	308 51 54.5	+4 57 11.9	15 23.06	56 27.74	-19.75		L	3 13 59.8	24.1	
	4.0	315 18 31.7	4 49 06.8	15 17.68	56 07.99	19.01	16.7	U	4 02 23.9	23.5	
	4.5	321 40 12.2	4 37 30.7	15 12.50	55 48.98	17.93		L	4 14 47.4	22.9	
	5.0	327 57 05.9	4 22 39.6	15 07.61	55 31.05	16.56	17.7	U	5 03 10.3	22.4	
	5.5	334 09 28.6	4 04 50.7	15 03.10	55 14.49	14.89		L	5 15 32.7	21.9	
	6.0	340 17 41.4	+3 44 21.8	14 59.04	54 59.60	-12.98	18.7	U	6 03 54.6	21.6	
	6.5	346 22 10.4	3 21 30.7	14 55.50	54 46.62	10.88		L	6 16 16.2	21.4	
	7.0	352 23 25.5	2 56 35.1	14 52.54	54 35.74	8.59	19.7	U	7 04 37.6	21.2	
	7.5	358 22 00.4	2 29 52.6	14 50.20	54 27.15	6.18		L	7 16 58.8	21.2	
	8.0	4 18 31.4	2 01 40.3	14 48.52	54 20.97	3.67	20.7	U	8 05 20.0	21.2	
	8.5	10 13 37.1	+1 32 15.1	14 47.52	54 17.30	-1.10		L	8 17 41.2	21.4	
	9.0	16 07 57.3	1 01 53.6	14 47.22	54 16.20	+1.48	21.7	U	9 06 02.6	21.7	
	9.5	22 02 12.9	+0 30 52.5	14 47.62	54 17.68	4.05		L	9 18 24.3	22.0	
	10.0	27 57 05.2	-0 00 31.5	14 48.72	54 21.73	6.56	22.7	U	10 06 46.3	22.4	
	10.5	33 53 14.9	0 32 01.2	14 50.51	54 28.29	8.97		L	10 19 08.7	22.8	
	11.0	39 51 21.8	-1 03 19.0	14 52.96	54 37.26	+11.26	23.7	U	11 07 31.5	23.4	
	11.5	45 52 04.0	1 34 06.8	14 56.02	54 48.52	13.36		L	11 19 54.9	24.0	
	12.0	51 55 57.3	2 04 05.3	14 59.67	55 01.88	15.27	24.7	U	12 08 18.9	24.5	
	12.5	58 03 34.7	2 32 54.5	15 03.83	55 17.15	16.93		L	12 20 43.4	25.1	
	13.0	64 15 24.9	3 00 13.4	15 08.44	55 34.08	18.29	25.7	U	13 09 08.5	25.6	
	13.5	70 31 52.3	-3 25 40.0	15 13.42	55 52.37	+19.34		L	13 21 34.1	26.1	
	14.0	76 53 15.9	3 48 52.1	15 18.69	56 11.71	20.05	26.7	U	14 10 00.2	26.5	
	14.5	83 19 48.9	4 09 26.9	15 24.15	56 31.76	20.39		L	14 22 26.7	26.8	
	15.0	89 51 37.7	4 27 01.8	15 29.71	56 52.15	20.36	27.7	U	15 10 53.5	27.0	
	15.5	96 28 41.7	4 41 15.4	15 35.25	57 12.51	19.94		L	15 23 20.5	27.1	
	16.0	103 10 53.4	-4 51 47.6	15 40.68	57 32.45	+19.16	28.7	U	16 11 47.6	27.1	
	16.5	109 57 58.0	4 58 20.9	15 45.90	57 51.61	18.03		..	..	..	
	17.0	116 49 34.2	5 00 41.0	15 50.82	58 09.64	16.60	0.2	L	17 00 14.7	27.1	
	17.5	123 45 15.0	4 58 37.9	15 55.34	58 26.24	14.91		U	17 12 41.8	26.8	
	18.0	130 44 28.7	4 52 06.2	15 59.40	58 41.15	13.01	1.2	L	18 01 08.6	26.7	
	18.5	137 46 40.4	-4 41 06.0	16 02.95	58 54.16	+10.97		U	18 13 35.3	26.4	
	19.0	144 51 13.3	4 25 43.1	16 05.94	59 05.13	8.85	2.2	L	19 02 01.7	26.3	
	19.5	151 57 30.4	4 06 08.9	16 08.35	59 13.98	6.73		U	19 14 28.0	26.1	
	20.0	159 04 56.2	3 42 40.4	16 10.18	59 20.71	4.63	3.2	L	20 02 54.1	26.0	
	20.5	166 12 57.5	3 15 39.5	16 11.44	59 25.34	2.61		U	20 15 20.1	26.0	
	21.0	173 21 05.2	-2 45 32.7	16 12.15	59 27.95	+0.74	4.2	L	21 03 46.1	25.9	
	21.5	180 28 54.1	2 12 50.0	16 12.35	59 28.69	-1.01		U	21 16 12.0	26.1	
	22.0	187 36 03.5	1 38 04.0	16 12.08	59 27.68	2.59	5.2	L	22 04 38.1	26.2	
	22.5	194 42 17.3	1 01 49.6	16 11.37	59 25.09	4.03		U	22 17 04.3	26.5	
	23.0	201 47 23.3	-0 24 42.4	16 10.28	59 21.06	5.32	6.2	L	23 05 30.8	26.7	
	23.5	208 51 12.4	+0 12 41.5	16 08.83	59 15.74	-6.48		U	23 17 57.5	27.1	
	24.0	215 53 38.3	+0 49 46.6	16 07.06	59 09.26		7.2	L	24 06 24.6		

UNIVERSAL TIME

Date		Longitude	Latitude		Semi-diameter	Horizontal Parallax		Age	Transit, Meridian of Greenwich			
		° ' "	° ' "	' "	' "	' "	"	d	d	h	m	m
July	24.0	215 53 38.3	+0 49 46.6	16 07.06	59 09.26			7.2	L	24 06 24.6	27.3	
	24.5	222 54 35.9	1 25 58.1	16 05.00	59 01.71	-7.55			U	24 18 51.9	27.6	
	25.0	229 54 00.7	2 00 42.9	16 02.68	58 53.18	8.53		8.2	L	25 07 19.5	27.9	
	25.5	236 51 48.0	2 33 30.2	16 00.11	58 43.73	9.45			U	25 19 47.4	28.0	
	26.0	243 47 51.8	3 03 51.4	15 57.29	58 33.40	10.33		9.2	L	26 08 15.4	28.1	
						11.18						
	26.5	250 42 04.7	+3 31 21.0	15 54.24	58 22.22	-12.01			U	26 20 43.5	28.0	
	27.0	257 34 17.4	3 55 36.9	15 50.97	58 10.21	12.80		10.2	L	27 09 11.5	27.7	
	27.5	264 24 18.5	4 16 20.5	15 47.49	57 57.41	13.56			U	27 21 39.2	27.5	
	28.0	271 11 55.0	4 33 17.1	15 43.79	57 43.85	14.26		11.2	L	28 10 06.7	27.0	
28.5	277 56 52.4	4 46 16.4	15 39.91	57 29.59	14.89			U	28 22 33.7	26.5		
29.0	284 38 55.5	+4 55 11.9	15 35.85	57 14.70	-15.42		12.2	L	29 11 00.2	25.9		
29.5	291 17 49.0	5 00 01.7	15 31.65	56 59.28	15.81			U	29 23 26.1	25.3		
30.0	297 53 18.7	5 00 47.6	15 27.34	56 43.47	16.05		13.2	L	30 11 51.4	24.6		
30.5	304 25 11.8	4 57 35.2	15 22.97	56 27.42	16.12							
31.0	310 53 18.3	4 50 33.6	15 18.58	56 11.30	15.98		14.2	U	31 00 16.0	24.1		
31.5	317 17 31.1	+4 39 54.7	15 14.22	55 55.32	-15.62			L	31 12 40.1	23.4		
Aug.	1.0	323 37 47.2	4 25 52.8	15 09.97	55 39.70	15.03		15.2	U	1 01 03.5	22.9	
	1.5	329 54 07.7	4 08 44.1	15 05.87	55 24.67	14.21			L	1 13 26.4	22.4	
	2.0	336 06 38.2	3 48 46.2	15 02.00	55 10.46	13.13		16.2	U	2 01 48.8	22.1	
	2.5	342 15 29.0	3 26 17.6	14 58.42	54 57.33	11.84			L	2 14 10.9	21.7	
	3.0	348 20 54.8	+3 01 37.0	14 55.20	54 45.49	-10.31		17.2	U	3 02 32.6	21.5	
	3.5	354 23 14.8	2 35 03.6	14 52.39	54 35.18	8.58			L	3 14 54.1	21.3	
	4.0	0 22 52.5	2 06 56.3	14 50.05	54 26.60	6.65		18.2	U	4 03 15.4	21.3	
	4.5	6 20 14.8	1 37 33.6	14 48.24	54 19.95	4.55			L	4 15 36.7	21.4	
	5.0	12 15 52.3	1 07 13.8	14 47.00	54 15.40	-2.29		19.2	U	5 03 58.1	21.4	
	5.5	18 10 18.7	+0 36 14.7	14 46.38	54 13.11	+0.07			L	5 16 19.5	21.7	
6.0	24 04 09.9	+0 04 53.7	14 46.40	54 13.18	2.54		20.2	U	6 04 41.2	21.9		
6.5	29 58 04.0	-0 26 32.0	14 47.09	54 15.72	5.07			L	6 17 03.1	22.2		
7.0	35 52 40.9	0 57 45.1	14 48.47	54 20.79	7.62		21.2	U	7 05 25.3	22.7		
7.5	41 48 40.9	1 28 28.4	14 50.55	54 28.41	10.17			L	7 17 48.0	23.2		
8.0	47 46 45.2	-1 58 24.4	14 53.32	54 38.58	+12.66		22.2	U	8 06 11.2	23.7		
8.5	53 47 34.6	2 27 15.1	14 56.77	54 51.24	15.06			L	8 18 34.9	24.2		
9.0	59 51 48.8	2 54 42.0	15 00.87	55 06.30	17.31		23.2	U	9 06 59.1	24.7		
9.5	66 00 05.8	3 20 25.6	15 05.59	55 23.61	19.37			L	9 19 23.8	25.3		
10.0	72 13 00.8	3 44 05.9	15 10.86	55 42.98	21.17		24.2	U	10 07 49.1	25.8		
10.5	78 31 05.5	-4 05 22.2	15 16.63	56 04.15	+22.67			L	10 20 14.9	26.2		
11.0	84 54 46.6	4 23 53.2	15 22.81	56 26.82	23.81		25.2	U	11 08 41.1	26.6		
11.5	91 24 25.2	4 39 17.6	15 29.29	56 50.63	24.52			L	11 21 07.7	26.9		
12.0	98 00 15.3	4 51 14.4	15 35.97	57 15.15	24.77		26.2	U	12 09 34.6	27.1		
12.5	104 42 23.0	4 59 23.8	15 42.72	57 39.92	24.53			L	12 22 01.7	27.2		
13.0	111 30 45.9	-5 03 27.7	15 49.40	58 04.45	+23.75		27.2	U	13 10 28.9	27.3		
13.5	118 25 12.2	5 03 11.0	15 55.87	58 28.20	22.44			L	13 22 56.2	27.2		
14.0	125 25 20.7	4 58 22.6	16 01.99	58 50.64	20.62		28.2	U	14 11 23.4	27.2		
14.5	132 30 41.2	4 48 56.5	16 07.61	59 11.26	18.30			L	14 23 50.6	27.1		
15.0	139 40 35.2	4 34 52.5	16 12.59	59 29.56	15.58		29.2					
15.5	146 54 17.5	-4 16 16.9	16 16.84	59 45.14	+12.51			U	15 12 17.7	27.0		
16.0	154 10 57.6	-3 53 23.2	16 20.25	59 57.65			0.9	L	16 00 44.7			

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Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich			
		° ' "	° ' "	' "	' " "	d	d	h	m	m
Aug.	16.0	154 10 57.6	-3 53 23.2	16 20.25	59 57.65	+ 9.22	L	16 00	44.7	26.9
	16.5	161 29 42.2	3 26 31.6	16 22.76	60 06.87	5.79	U	16 13	11.6	26.8
	17.0	168 49 37.0	2 56 08.8	16 24.34	60 12.66	+ 2.37	L	17 01	38.4	26.8
	17.5	176 09 49.4	2 22 47.3	16 24.98	60 15.03	- 0.95	U	17 14	05.2	26.8
	18.0	183 29 30.1	1 47 03.7	16 24.72	60 14.08	4.09	L	18 02	32.0	27.0
	18.5	190 47 54.8	-1 09 37.7	16 23.61	60 09.99	- 6.92	U	18 14	59.0	27.0
	19.0	198 04 25.4	-0 31 10.7	16 21.72	60 03.07	9.43	L	19 03	26.0	27.2
	19.5	205 18 30.5	+0 07 36.0	16 19.15	59 53.64	11.56	U	19 15	53.2	27.3
	20.0	212 29 45.5	0 46 02.0	16 16.00	59 42.08	13.31	L	20 04	20.5	27.6
	20.5	219 37 52.3	1 23 29.0	16 12.38	59 28.77	14.67	U	20 16	48.1	27.7
	21.0	226 42 38.8	+1 59 21.8	16 08.38	59 14.10	-15.69	L	21 05	15.8	27.8
	21.5	233 43 57.8	2 33 08.4	16 04.10	58 58.41	16.39	U	21 17	43.6	27.9
	22.0	240 41 46.3	3 04 21.0	15 59.64	58 42.02	16.80	L	22 06	11.5	27.9
	22.5	247 36 04.2	3 32 35.4	15 55.06	58 25.22	17.00	U	22 18	39.4	27.7
	23.0	254 26 53.4	3 57 31.3	15 50.43	58 08.22	17.01	L	23 07	07.1	27.6
	23.5	261 14 17.1	+4 18 52.5	15 45.80	57 51.21	-16.87	U	23 19	34.7	27.2
	24.0	267 58 18.9	4 36 26.7	15 41.20	57 34.34	16.63	L	24 08	01.9	26.8
	24.5	274 39 02.2	4 50 05.1	15 36.67	57 17.71	16.31	U	24 20	28.7	26.4
	25.0	281 16 30.1	4 59 42.5	15 32.23	57 01.40	15.95	L	25 08	55.1	25.8
	25.5	287 50 44.8	5 05 17.1	15 27.88	56 45.45	15.55	U	25 21	20.9	25.3
	26.0	294 21 47.8	+5 06 50.2	15 23.65	56 29.90	-15.11	L	26 09	46.2	24.7
	26.5	300 49 40.4	5 04 26.3	15 19.53	56 14.79	14.66	U	26 22	10.9	24.2
	27.0	307 14 23.0	4 58 12.7	15 15.53	56 00.13	14.16	L	27 10	35.1	23.5
	27.5	313 35 56.6	4 48 19.2	15 11.68	55 45.97	13.61	U	27 22	58.6	23.1
	28.0	319 54 22.1	4 34 58.0	15 07.97	55 32.36	13.02	L	28 11	21.7	22.7
	28.5	326 09 41.5	+4 18 23.6	15 04.42	55 19.34	-12.36	U	28 23	44.4	22.2
	29.0	332 21 58.1	3 58 51.7	15 01.05	55 06.98	11.59	L	29 12	06.6	22.0
	29.5	338 31 16.9	3 36 39.7	14 57.90	54 55.39	10.73	U	30 00	28.6	21.6
	30.0	344 37 44.9	3 12 06.1	14 54.97	54 44.66	9.74	L	30 12	50.2	21.5
	30.5	350 41 31.6	2 45 30.0	14 52.32	54 34.92	8.62	L	30 12	50.2	21.5
	31.0	356 42 49.1	+2 17 11.0	14 49.97	54 26.30	- 7.35	U	31 01	11.7	21.4
	31.5	2 41 52.3	1 47 28.7	14 47.97	54 18.95	5.93	L	31 13	33.1	21.4
Sept.	1.0	8 38 59.0	1 16 42.7	14 46.35	54 13.02	4.36	U	1 01	54.5	21.3
	1.5	14 34 29.8	0 45 12.6	14 45.16	54 08.66	2.63	L	1 14	15.8	21.5
	2.0	20 28 48.3	+0 13 17.2	14 44.45	54 06.03	0.76	U	2 02	37.3	21.7
	2.5	26 22 21.0	-0 18 44.7	14 44.24	54 05.27	+ 1.26	L	2 14	59.0	22.0
	3.0	32 15 36.9	0 50 34.9	14 44.58	54 06.53	3.40	U	3 03	21.0	22.2
	3.5	38 09 07.4	1 21 55.5	14 45.51	54 09.93	5.67	L	3 15	43.2	22.6
	4.0	44 03 26.1	1 52 28.9	14 47.06	54 15.60	8.02	U	4 04	05.8	22.9
	4.5	49 59 08.5	2 21 57.7	14 49.24	54 23.62	10.44	L	4 16	28.7	23.5
	5.0	55 56 51.5	-2 50 04.5	14 52.08	54 34.06	+12.88	U	5 04	52.2	23.8
	5.5	61 57 12.9	3 16 31.8	14 55.59	54 46.94	15.32	L	5 17	16.0	24.3
	6.0	68 00 51.0	3 41 01.7	14 59.77	55 02.26	17.70	U	6 05	40.3	24.8
	6.5	74 08 24.0	4 03 16.1	15 04.59	55 19.96	20.00	L	6 18	05.1	25.2
	7.0	80 20 28.7	4 22 56.6	15 10.04	55 39.96	22.13	U	7 06	30.3	25.6
	7.5	86 37 40.3	-4 39 44.3	15 16.07	56 02.09	+24.04	L	7 18	55.9	26.0
	8.0	93 00 31.0	-4 53 20.4	15 22 62	56 26.13		U	8 07	21.9	

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Date	Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich
	° ' "	° ' "	' "	' " "	d	d h m
Sept. 8.0	93 00 31.0	-4 53 20.4	15 22.62	56 26.13	23.9	U 8 07 21.9 ^m
8.5	99 29 28.6	5 03 26.0	15 29.61	56 51.80 ^{+25.67}		L 8 19 48.1 ^{26.2}
9.0	106 04 55.9	5 09 43.1	15 36.94	57 18.72 ^{26.92}	24.9	U 9 08 14.7 ^{26.6}
9.5	112 47 08.8	5 11 54.7	15 44.50	57 46.46 ^{27.74}		L 9 20 41.4 ^{26.7}
10.0	119 36 15.4	5 09 46.0	15 52.14	58 14.50 ^{28.04}	25.9	U 10 09 08.3 ^{26.9}
						^{26.9}
10.5	126 32 14.5	-5 03 05.3	15 59.71	58 42.27 ^{+26.87}		L 10 21 35.2 ^{27.1}
11.0	133 34 55.3	4 51 45.1	16 07.03	59 09.14 ^{25.30}	26.9	U 11 10 02.3 ^{27.1}
11.5	140 43 56.0	4 35 43.4	16 13.92	59 34.44 ^{23.08}		L 11 22 29.4 ^{27.2}
12.0	147 58 44.5	4 15 04.3	16 20.21	59 57.52 ^{20.20}	27.9	U 12 10 56.6 ^{27.3}
12.5	155 18 38.5	3 49 59.4	16 25.71	60 17.72 ^{16.75}		L 12 23 23.9 ^{27.4}
						^{27.5}
13.0	162 42 46.6	-3 20 48.0	16 30.28	60 34.47 ^{+12.82}	28.9	U 13 11 51.3 ^{27.5}
13.5	170 10 10.0	2 47 57.0	16 33.77	60 47.29 ^{8.53}		L 14 00 18.8 ^{27.6}
14.0	177 39 45.1	2 12 00.8	16 36.09	60 55.82 ^{+4.03}	0.5	U 14 12 46.4 ^{27.8}
14.5	185 10 25.3	1 33 39.9	16 37.19	60 59.85 ^{-0.49}		L 15 01 14.2 ^{28.1}
15.0	192 41 04.4	0 53 39.1	16 37.06	60 59.36 ^{4.89}	1.5	U 15 13 42.3 ^{28.2}
						^{28.2}
15.5	200 10 38.5	-0 12 46.2	16 35.73	60 54.47 ^{-9.01}	2.5	L 16 02 10.5 ^{28.4}
16.0	207 38 08.8	+0 28 10.6	16 33.27	60 45.46 ^{12.73}		U 16 14 38.9 ^{28.6}
16.5	215 02 43.0	1 08 24.3	16 29.80	60 32.73 ^{15.94}	3.5	L 17 03 07.5 ^{28.7}
17.0	222 23 36.6	1 47 10.8	16 25.46	60 16.79 ^{18.59}		U 17 15 36.2 ^{28.7}
17.5	229 40 13.9	2 23 50.7	16 20.39	59 58.20 ^{20.66}		L 18 04 04.9 ^{28.6}
						^{28.4}
18.0	236 52 07.7	+2 57 49.6	16 14.77	59 37.54 ^{-22.13}	4.5	U 18 16 33.5 ^{28.4}
18.5	243 58 59.2	3 28 38.9	16 08.74	59 15.41 ^{23.06}		L 19 05 01.9 ^{28.2}
19.0	251 00 37.6	3 55 55.8	16 02.45	58 52.35 ^{23.50}	5.5	U 19 17 30.1 ^{27.7}
19.5	257 56 58.6	4 19 23.1	15 56.05	58 28.85 ^{23.48}		L 20 05 57.8 ^{27.3}
20.0	264 48 04.0	4 38 49.0	15 49.65	58 05.37 ^{23.10}	6.5	U 20 18 25.1 ^{26.7}
						^{26.1}
20.5	271 34 00.1	+4 54 06.1	15 43.36	57 42.27 ^{-22.43}	7.5	L 21 06 51.8 ^{25.5}
21.0	278 14 57.1	5 05 11.2	15 37.25	57 19.84 ^{21.52}		U 21 19 17.9 ^{24.8}
21.5	284 51 07.6	5 12 04.8	15 31.39	56 58.32 ^{20.44}	8.5	L 22 07 43.4 ^{24.3}
22.0	291 22 46.5	5 14 50.2	15 25.82	56 37.88 ^{19.26}		U 22 20 08.2 ^{23.7}
22.5	297 50 09.3	5 13 33.6	15 20.57	56 18.62 ^{17.99}		L 23 08 32.5 ^{23.1}
						^{22.7}
23.0	304 13 32.3	+5 08 23.2	15 15.67	56 00.63 ^{-16.69}	9.5	U 24 09 19.3 ^{22.3}
23.5	310 33 11.7	4 59 29.5	15 11.12	55 43.94 ^{15.40}		L 25 10 04.3 ^{21.9}
24.0	316 49 23.4	4 47 04.4	15 06.93	55 28.54 ^{14.12}	10.5	U 25 22 26.2 ^{21.7}
24.5	323 02 23.1	4 31 21.3	15 03.08	55 14.42 ^{12.86}		L 26 10 47.9 ^{21.5}
25.0	329 12 25.8	4 12 35.3	14 59.58	55 01.56 ^{11.63}	11.5	U 26 23 09.4 ^{21.4}
						^{21.3}
25.5	335 19 45.7	+3 51 02.3	14 56.41	54 49.93 ^{-10.43}	12.5	L 27 11 30.8 ^{21.3}
26.0	341 24 36.8	3 26 59.4	14 53.57	54 39.50 ^{9.25}		U 27 23 52.1 ^{21.3}
26.5	347 27 12.8	3 00 44.7	14 51.05	54 30.25 ^{8.09}	13.5	L 28 12 13.4 ^{21.5}
27.0	353 27 47.3	2 32 36.8	14 48.84	54 22.16 ^{6.93}		U 29 00 34.9 ^{21.6}
27.5	359 26 33.9	2 02 54.9	14 46.95	54 15.23 ^{5.75}	14.5	L 29 12 56.5 ^{21.7}
						^{22.1}
28.0	5 23 46.8	+1 31 58.6	14 45.39	54 09.48 ^{-4.53}		U 30 01 18.2 ^{22.3}
28.5	11 19 40.8	1 00 07.7	14 44.15	54 04.95 ^{3.27}	15.5	L 30 13 40.3 ^{22.3}
29.0	17 14 31.4	+0 27 42.2	14 43.26	54 01.68 ^{1.95}		U 1 02 02.6
29.5	23 08 35.4	-0 04 58.2	14 42.73	53 59.73 ^{-0.52}	16.5	
30.0	29 02 10.8	0 37 33.9	14 42.59	53 59.21 ^{+0.98}		
30.5	34 55 37.3	-1 09 45.7	14 42.86	54 00.19 ^{+2.58}	17.5	
Oct. 1.0	40 49 16.2	-1 41 14.6	14 43.56	54 02.77		

UNIVERSAL TIME

Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich				
		° ' "	° ' "	' "	' " "	d		d	h	m	m
Oct.	1.0	40 49 16.2	-1 41 14.6	14 43.56	54 02.77	+ 4.30	17.5	U	1 02	02.6	22.6
	1.5	46 43 30.4	2 11 42.2	14 44.73	54 07.07	6.13		L	1 14	25.2	23.0
	2.0	52 38 44.7	2 40 50.5	14 46.40	54 13.20	8.04	18.5	U	2 02	48.2	23.4
	2.5	58 35 25.8	3 08 21.9	14 48.59	54 21.24	10.07		L	2 15	11.6	23.7
	3.0	64 34 01.8	3 33 59.1	14 51.34	54 31.31	12.18	19.5	U	3 03	35.3	24.1
	3.5	70 35 02.3	-3 57 25.2	14 54.65	54 43.49	+14.33		L	3 15	59.4	24.4
	4.0	76 38 58.3	4 18 23.5	14 58.56	54 57.82	16.51	20.5	U	4 04	23.8	24.7
	4.5	82 46 21.6	4 36 37.7	15 03.06	55 14.33	18.69		L	4 16	48.5	25.1
	5.0	88 57 44.3	4 51 51.5	15 08.15	55 33.02	20.82	21.5	U	5 05	13.6	25.2
	5.5	95 13 38.3	5 03 49.2	15 13.82	55 53.84	22.84		L	5 17	38.8	25.5
	6.0	101 34 34.7	-5 12 15.2	15 20.04	56 16.68	+24.69	22.5	U	6 06	04.3	25.7
	6.5	108 01 02.7	5 16 54.9	15 26.77	56 41.37	26.30		L	6 18	30.0	25.9
	7.0	114 33 28.8	5 17 34.6	15 33.94	57 07.67	27.60	23.5	U	7 06	55.9	26.0
	7.5	121 12 15.3	5 14 02.0	15 41.45	57 35.27	28.48		L	7 19	21.9	26.1
	8.0	127 57 39.5	5 06 07.5	15 49.21	58 03.75	28.88	24.5	U	8 07	48.0	26.3
	8.5	134 49 52.3	-4 53 44.3	15 57.08	58 32.63	+28.72		L	8 20	14.3	26.4
	9.0	141 48 56.3	4 36 49.7	16 04.91	59 01.35	27.91	25.5	U	9 08	40.7	26.7
	9.5	148 54 45.7	4 15 26.1	16 12.51	59 29.26	26.41		L	9 21	07.4	26.8
	10.0	156 07 04.4	3 49 41.9	16 19.70	59 55.67	24.17	26.5	U	10 09	34.2	27.1
	10.5	163 25 26.0	3 19 52.4	16 26.29	60 19.84	21.21		L	10 22	01.3	27.4
	11.0	170 49 12.9	-2 46 20.6	16 32.07	60 41.05	+17.56	27.5	U	11 10	28.7	27.7
	11.5	178 17 37.6	2 09 37.2	16 36.85	60 58.61	13.33		L	11 22	56.4	28.1
	12.0	185 49 43.0	1 30 19.9	16 40.49	61 11.94	8.63	28.5	U	12 11	24.5	28.5
	12.5	193 24 24.5	0 49 13.0	16 42.84	61 20.57	+ 3.62		L	12 23	53.0	28.9
	13.0	201 00 31.9	-0 07 05.4	16 43.82	61 24.19	- 1.51	0.1	...	...	...	...
	13.5	208 36 52.0	+0 35 11.1	16 43.41	61 22.68	- 6.54		U	13 12	21.9	29.2
	14.0	216 12 11.9	1 16 44.7	16 41.63	61 16.14	11.32	1.1	L	14 00	51.1	29.6
	14.5	223 45 21.0	1 56 45.3	16 38.54	61 04.82	15.65		U	14 13	20.7	29.7
	15.0	231 15 14.2	2 34 26.9	16 34.28	60 49.17	19.41	2.1	L	15 01	50.4	29.8
	15.5	238 40 53.9	3 09 09.3	16 28.99	60 29.76	22.52		U	15 14	20.2	29.7
	16.0	246 01 31.4	+3 40 19.4	16 22.86	60 07.24	-24.91	3.1	L	16 02	49.9	29.5
	16.5	253 16 28.3	4 07 31.5	16 16.07	59 42.33	26.59		U	16 15	19.4	29.2
	17.0	260 25 16.4	4 30 27.4	16 08.85	59 15.74	27.59	4.1	L	17 03	48.6	28.5
	17.5	267 27 37.9	4 48 56.2	16 01.31	58 48.15	27.94		U	17 16	17.1	28.0
	18.0	274 23 24.7	5 02 52.8	15 53.70	58 20.21	27.73	5.1	L	18 04	45.1	27.3
	18.5	281 12 37.4	+5 12 17.9	15 46.14	57 52.48	-27.06		U	18 17	12.4	26.4
	19.0	287 55 24.1	5 17 16.4	15 38.77	57 25.42	25.98	6.1	L	19 05	38.8	25.8
	19.5	294 31 59.2	5 17 56.7	15 31.69	56 59.44	24.60		U	19 18	04.6	24.9
	20.0	301 02 42.0	5 14 29.8	15 24.99	56 34.84	22.97	7.1	L	20 06	29.5	24.3
	20.5	307 27 55.9	5 07 08.6	15 18.73	56 11.87	21.18		U	20 18	53.8	23.5
	21.0	313 48 06.6	+4 56 07.5	15 12.96	55 50.69	-19.29	8.1	L	21 07	17.3	23.0
	21.5	320 03 41.5	4 41 41.9	15 07.71	55 31.40	17.34		U	21 19	40.3	22.5
	22.0	326 15 09.3	4 24 07.8	15 02.98	55 14.06	15.40	9.1	L	22 08	02.8	22.1
	22.5	332 22 58.4	4 03 41.8	14 58.79	54 58.66	13.48		U	22 20	24.9	21.7
	23.0	338 27 36.9	3 40 40.9	14 55.11	54 45.18	11.60	10.1	L	23 08	46.6	21.5
	23.5	344 29 32.2	+3 15 22.5	14 51.95	54 33.58	- 9.80		U	23 21	08.1	21.3
	24.0	350 29 10.3	+2 48 04.4	14 49.28	54 23.78		11.1	L	24 09	29.4	

UNIVERSAL TIME

Date		Longitude	Latitude			Semi-diameter	Horizontal Parallax			Age	Transit, Meridian of Greenwich				
		° ' "	° ' "	° ' "	° ' "	' "	' "	' "	' "	d	L	d	h	m	m
Oct.	24.0	350 29 10.3	+2 48 04.4	14 49.28	54 23.78					11.1	L	24 09 29.4			21.3
	24.5	356 26 56.2	2 19 04.6	14 47.08	54 15.71	- 8.07					U	24 21 50.7			21.2
	25.0	2 23 13.3	1 48 41.7	14 45.33	54 09.27	6.44				12.1	L	25 10 11.9			21.3
	25.5	8 18 23.4	1 17 14.4	14 44.00	54 04.38	4.89					U	25 22 33.2			21.5
	26.0	14 12 46.9	0 45 01.7	14 43.06	54 00.95	3.43				13.1	L	26 10 54.7			21.6
						2.02									
	26.5	20 06 43.2	+0 12 23.2	14 42.51	53 58.93						U	26 23 16.3			21.9
	27.0	26 00 30.0	-0 20 21.7	14 42.33	53 58.25	- 0.68				14.1	L	27 11 38.2			22.2
	27.5	31 54 24.4	0 52 53.4	14 42.49	53 58.85	+ 0.60									
	28.0	37 48 42.6	1 24 52.3	14 43.00	54 00.73	1.88				15.1	U	28 00 00.4			22.5
	28.5	43 43 40.4	1 55 58.7	14 43.86	54 03.87	3.14					L	28 12 22.9			22.8
						4.42									
	29.0	49 39 33.2	-2 25 53.7	14 45.06	54 08.29					16.1	U	29 00 45.7			23.2
	29.5	55 36 36.7	2 54 18.3	14 46.62	54 14.00	+ 5.71					L	29 13 08.9			23.5
	30.0	61 35 06.8	3 20 54.4	14 48.54	54 21.05	7.05				17.1	U	30 01 32.4			23.9
	30.5	67 35 19.9	3 45 24.2	14 50.84	54 29.49	8.44					L	30 13 56.3			24.2
	31.0	73 37 33.4	4 07 30.8	14 53.54	54 39.39	9.90				18.1	U	31 02 20.5			24.4
						11.42									
Nov.	31.5	79 42 05.2	-4 26 58.1	14 56.65	54 50.81	+13.00					L	31 14 44.9			24.7
	1.0	85 49 14.5	4 43 30.9	15 00.19	55 03.81	14.64				19.1	U	1 03 09.6			24.9
	1.5	91 59 21.6	4 56 55.0	15 04.18	55 18.45	16.32					L	1 15 34.5			24.9
	2.0	98 12 47.5	5 06 57.1	15 08.62	55 34.77	18.01				20.1	U	2 03 59.4			25.1
	2.5	104 29 54.4	5 13 25.1	15 13.53	55 52.78	19.68					L	2 16 24.5			25.1
	3.0	110 51 04.6	-5 16 08.1	15 18.89	56 12.46	+21.30				21.1	U	3 04 49.6			25.2
	3.5	117 16 40.8	5 14 56.9	15 24.70	56 33.76	22.79					L	3 17 14.8			25.2
	4.0	123 47 05.0	5 09 43.9	15 30.91	56 56.55	24.12				22.1	U	4 05 40.0			25.2
	4.5	130 22 38.2	5 00 23.5	15 37.48	57 20.67	25.21					L	4 18 05.2			25.4
	5.0	137 03 39.5	4 46 53.0	15 44.35	57 45.88	25.99				23.1	U	5 06 30.6			25.4
	5.5	143 50 24.8	-4 29 12.4	15 51.43	58 11.87	+26.36					L	5 18 56.0			25.6
	6.0	150 43 05.9	4 07 25.8	15 58.61	58 38.23	26.26				24.1	U	6 07 21.6			25.8
	6.5	157 41 49.4	3 41 41.6	16 05.76	59 04.49	25.60					L	6 19 47.4			26.1
	7.0	164 46 35.0	3 12 13.3	16 12.73	59 30.09	24.32				25.1	U	7 08 13.5			26.5
	7.5	171 57 14.9	2 39 20.4	16 19.36	59 54.41	22.39					L	7 20 40.0			26.9
	8.0	179 13 32.3	-2 03 28.3	16 25.46	60 16.80	+19.78				26.1	U	8 09 06.9			27.5
	8.5	186 35 00.7	1 25 09.1	16 30.85	60 36.58	16.51					L	8 21 34.4			28.0
	9.0	194 01 03.6	0 45 00.9	16 35.35	60 53.09	12.63				27.1	U	9 10 02.4			28.5
	9.5	201 30 54.3	-0 03 47.0	16 38.79	61 05.72	8.24					L	9 22 30.9			29.2
	10.0	209 03 37.0	+0 37 44.9	16 41.04	61 13.96	+ 3.49				28.1	U	10 11 00.1			29.6
	10.5	216 38 08.0	+1 18 44.9	16 41.99	61 17.45	- 1.47					L	10 23 29.7			30.1
	11.0	224 13 17.5	1 58 22.6	16 41.59	61 15.98	6.43				29.1	U	11 11 59.8			30.4
	11.5	231 47 52.5	2 35 49.6	16 39.84	61 09.55	11.21									
	12.0	239 20 39.4	3 10 21.8	16 36.78	60 58.34	15.65				0.7	L	12 00 30.2			30.4
	12.5	246 50 27.3	3 41 21.0	16 32.52	60 42.69	19.59					U	12 13 00.6			30.4
	13.0	254 16 10.3	+4 08 16.2	16 27.18	60 23.10	-22.89				1.7	L	13 01 31.0			30.1
	13.5	261 36 50.6	4 30 44.9	16 20.94	60 00.21	25.51					U	13 14 01.1			29.7
	14.0	268 51 40.3	4 48 32.8	16 13.99	59 34.70	27.41				2.7	L	14 02 30.8			29.0
	14.5	276 00 02.4	5 01 33.3	16 06.52	59 07.29	28.58					U	14 14 59.8			28.2
	15.0	283 01 31.5	5 09 46.9	15 58.74	58 38.71	29.07				3.7	L	15 03 28.0			27.3
	15.5	289 55 53.7	+5 13 20.2	15 50.82	58 09.64	-28.93					U	15 15 55.3			26.5
	16.0	296 43 05.9	+5 12 24.4	15 42.94	57 40.71					4.7	L	16 04 21.8			

UNIVERSAL TIME

Date		Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich			
		° ' "	° ' "	' "	' " "	d	d	h	m	^m
Nov.	16.0	296 43 05.9	+5 12 24.4	15 42.94	57 40.71	-28.25	L	16 04	21.8	25.6
	16.5	303 23 14.7	5 07 14.0	15 35.24	57 12.46	27.09	U	16 16	47.4	24.8
	17.0	309 56 35.0	4 58 06.1	15 27.86	56 45.37	25.56	L	17 05	12.2	24.0
	17.5	316 23 29.0	4 45 19.1	15 20.90	56 19.81	23.71	U	17 17	36.2	23.3
	18.0	322 44 24.2	4 29 12.3	15 14.44	55 56.10	21.65	L	18 05	59.5	22.7
	18.5	328 59 52.3	+4 10 05.3	15 08.54	55 34.45	-19.42	U	18 18	22.2	22.2
	19.0	335 10 28.0	3 48 17.5	15 03.25	55 15.03	17.10	L	19 06	44.4	21.8
	19.5	341 16 47.8	3 24 08.0	14 58.59	54 57.93	14.74	U	19 19	06.2	21.5
	20.0	347 19 29.1	2 57 55.6	14 54.57	54 43.19	12.38	L	20 07	27.7	21.3
	20.5	353 19 09.1	2 29 58.7	14 51.20	54 30.81	10.05	U	20 19	49.0	21.2
	21.0	359 16 24.5	+2 00 35.7	14 48.46	54 20.76	-7.80	L	21 08	10.2	21.2
	21.5	5 11 50.9	1 30 04.3	14 46.34	54 12.96	5.64	U	21 20	31.4	21.3
	22.0	11 06 02.0	0 58 42.7	14 44.80	54 07.32	3.59	L	22 08	52.7	21.4
	22.5	16 59 29.8	+0 26 48.8	14 43.82	54 03.73	-1.68	U	22 21	14.1	21.7
	23.0	22 52 43.8	-0 05 19.2	14 43.36	54 02.05	+0.12	L	23 09	35.8	22.0
	23.5	28 46 11.2	-0 37 22.8	14 43.39	54 02.17	+1.76	U	23 21	57.8	22.2
	24.0	34 40 16.5	1 09 03.4	14 43.88	54 03.93	3.28	L	24 10	20.0	22.7
	24.5	40 35 21.6	1 40 02.1	14 44.77	54 07.21	4.67	U	24 22	42.7	23.1
	25.0	46 31 45.8	2 10 00.0	14 46.04	54 11.88	5.92	L	25 11	05.8	23.4
	25.5	52 29 46.1	2 38 37.9	14 47.65	54 17.80	7.08	U	25 23	29.2	23.9
	26.0	58 29 36.9	-3 05 36.7	14 49.58	54 24.88	+8.14	L	26 11	53.1	24.2
	26.5	64 31 30.2	3 30 37.8	14 51.80	54 33.02	9.12	...	...	...	...
	27.0	70 35 36.3	3 53 23.2	14 54.29	54 42.14	10.05	U	27 00	17.3	24.5
	27.5	76 42 04.0	4 13 35.5	14 57.03	54 52.19	10.94	L	27 12	41.8	24.8
	28.0	82 51 00.5	4 30 58.4	15 00.01	55 03.13	11.81	U	28 01	06.6	24.9
	28.5	89 02 32.6	-4 45 16.7	15 03.22	55 14.94	+12.67	L	28 13	31.5	25.1
	29.0	95 16 46.3	4 56 17.1	15 06.67	55 27.61	13.53	U	29 01	56.6	25.2
	29.5	101 33 47.8	5 03 47.8	15 10.36	55 41.14	14.40	L	29 14	21.8	25.1
	30.0	107 53 43.5	5 07 38.9	15 14.28	55 55.54	15.29	U	30 02	46.9	25.1
	30.5	114 16 40.7	5 07 42.8	15 18.45	56 10.83	16.19	L	30 15	12.0	25.1
Dec.	1.0	120 42 47.4	-5 03 54.1	15 22.86	56 27.02	+17.08	U	1 03	37.1	24.9
	1.5	127 12 12.7	4 56 09.9	15 27.51	56 44.10	17.93	L	1 16	02.0	24.9
	2.0	133 45 06.7	4 44 30.0	15 32.40	57 02.03	18.73	U	2 04	26.9	24.8
	2.5	140 21 40.5	4 28 56.9	15 37.50	57 20.76	19.42	L	2 16	51.7	24.8
	3.0	147 02 05.6	4 09 36.0	15 42.79	57 40.18	19.98	U	3 05	16.5	24.9
	3.5	153 46 33.5	-3 46 36.3	15 48.23	58 00.16	+20.32	L	3 17	41.4	25.0
	4.0	160 35 15.2	3 20 10.0	15 53.77	58 20.48	20.41	U	4 06	06.4	25.2
	4.5	167 28 20.0	2 50 33.2	15 59.33	58 40.89	20.16	L	4 18	31.6	25.5
	5.0	174 25 54.6	2 18 06.1	16 04.82	59 01.05	19.53	U	5 06	57.1	25.8
	5.5	181 28 01.9	1 43 13.1	16 10.14	59 20.58	18.46	L	5 19	22.9	26.4
	6.0	188 34 40.0	-1 06 22.8	16 15.17	59 39.04	+16.91	U	6 07	49.3	26.9
	6.5	195 45 40.6	-0 28 08.3	16 19.78	59 55.95	14.85	L	6 20	16.2	27.5
	7.0	203 00 48.0	+0 10 53.4	16 23.83	60 10.80	12.29	U	7 08	43.7	28.2
	7.5	210 19 38.2	0 50 02.1	16 27.18	60 23.09	9.23	L	7 21	11.9	28.8
	8.0	217 41 38.4	1 28 35.1	16 29.69	60 32.32	5.76	U	8 09	40.7	29.4
	8.5	225 06 07.1	+2 05 48.4	16 31.26	60 38.08	+1.96	L	8 22	10.1	29.9
	9.0	232 32 14.4	+2 40 58.7	16 31.79	60 40.04		U	9 10	40.0	

UNIVERSAL TIME

Date	Longitude	Latitude	Semi-diameter	Horizontal Parallax	Age	Transit, Meridian of Greenwich
	° ' "	° ' "	' "	' "	d	d h m m
Dec. 9.0	232 32 14.4	+2 40 58.7	16 31.79	60 40.04	27.7	U 9 10 40.0
9.5	239 59 03.3	3 13 24.5	16 31.23	60 37.96	-2.08	L 9 23 10.2
10.0	247 25 31.7	3 42 28.5	16 29.54	60 31.77	6.19	U 10 11 40.5
10.5	254 50 34.4	4 07 38.8	16 26.75	60 21.54	10.23	.. .. .
11.0	262 13 06.2	4 28 29.9	16 22.92	60 07.47	14.07	L 11 00 10.9
					17.56	.. .. .
11.5	269 32 04.8	+4 44 44.1	16 18.13	59 49.91	-20.61	U 11 12 40.9
12.0	276 46 32.9	4 56 11.7	16 12.52	59 29.30	23.09	L 12 01 10.5
12.5	283 55 41.3	5 02 50.2	16 06.23	59 06.21	24.98	U 12 13 39.4
13.0	290 58 50.2	5 04 44.4	15 59.42	58 41.23	26.24	L 13 02 07.5
13.5	297 55 30.4	5 02 04.7	15 52.27	58 14.99	26.88	U 13 14 34.8
						26.4
14.0	304 45 23.8	+4 55 06.3	15 44.95	57 48.11	-26.94	L 14 03 01.2
14.5	311 28 23.2	4 44 08.2	15 37.61	57 21.17	26.45	U 14 15 26.8
15.0	318 04 31.7	4 29 31.2	15 30.41	56 54.72	25.46	L 15 03 51.5
15.5	324 34 01.6	4 11 37.8	15 23.47	56 29.26	24.06	U 15 16 15.4
16.0	330 57 13.3	3 50 50.7	15 16.92	56 05.20	22.31	L 16 04 38.6
						22.7
16.5	337 14 33.8	+3 27 32.5	15 10.84	55 42.89	-20.26	U 16 17 01.3
17.0	343 26 35.2	3 02 05.2	15 05.32	55 22.63	18.01	L 17 05 23.5
17.5	349 33 54.1	2 34 50.0	15 00.41	55 04.62	15.59	U 17 17 45.3
18.0	355 37 09.4	2 06 07.1	14 56.16	54 49.03	13.07	L 18 06 06.8
18.5	1 37 02.2	1 36 15.9	14 52.60	54 35.96	10.50	U 18 18 28.2
						21.3
19.0	7 34 14.2	+1 05 35.0	14 49.74	54 25.46	-7.91	L 19 06 49.5
19.5	13 29 27.4	0 34 22.4	14 47.58	54 17.55	5.37	U 19 19 10.9
20.0	19 23 23.1	+0 02 55.4	14 46.12	54 12.18	2.89	L 20 07 32.3
20.5	25 16 41.3	-0 28 28.7	14 45.34	54 09.29	-0.50	U 20 19 54.0
21.0	31 10 00.2	0 59 32.8	14 45.20	54 08.79	+1.76	L 21 08 16.0
						22.3
21.5	37 03 55.7	-1 29 59.5	14 45.68	54 10.55	+3.87	U 21 20 38.3
22.0	42 59 01.1	1 59 31.5	14 46.73	54 14.42	5.81	L 22 09 01.0
22.5	48 55 46.6	2 27 51.1	14 48.31	54 20.23	7.56	U 22 21 24.1
23.0	54 54 38.8	2 54 40.5	14 50.37	54 27.79	9.12	L 23 09 47.7
23.5	60 56 00.8	3 19 41.5	14 52.86	54 36.91	10.48	U 23 22 11.7
						24.4
24.0	67 00 11.5	-3 42 36.0	14 55.71	54 47.39	+11.62	L 24 10 36.1
24.5	73 07 26.0	4 03 06.0	14 58.88	54 59.01	12.56	U 24 23 00.9
25.0	79 17 55.1	4 20 54.2	15 02.30	55 11.57	13.30	L 25 11 26.0
25.5	85 31 45.6	4 35 44.0	15 05.93	55 24.87	13.85	U 25 23 51.4
26.0	91 49 00.6	4 47 20.2	15 09.70	55 38.72	14.23	.. .. .
						
26.5	98 09 39.5	-4 55 29.0	15 13.58	55 52.95	+14.46	L 26 12 16.9
27.0	104 33 38.9	4 59 59.0	15 17.52	56 07.41	14.56	U 27 00 42.5
27.5	111 00 52.7	5 00 41.3	15 21.49	56 21.97	14.55	L 27 13 08.1
28.0	117 31 13.4	4 57 29.8	15 25.45	56 36.52	14.46	U 28 01 33.7
28.5	124 04 32.5	4 50 21.6	15 29.39	56 50.98	14.31	L 28 13 59.1
						25.4
29.0	130 40 41.0	-4 39 17.2	15 33.29	57 05.29	+14.11	U 29 02 24.5
29.5	137 19 30.6	4 24 21.0	15 37.13	57 19.40	13.90	L 29 14 49.6
30.0	144 00 54.2	4 05 40.6	15 40.92	57 33.30	13.67	U 30 03 14.6
30.5	150 44 46.3	3 43 27.6	15 44.64	57 46.97	13.41	L 30 15 39.5
31.0	157 31 03.0	3 17 56.9	15 48.29	58 00.38	13.11	U 31 04 04.4
						24.9
31.5	164 19 42.8	-2 49 26.8	15 51.87	58 13.49	+12.79	L 31 16 29.3
32.0	171 10 45.8	-2 18 18.9	15 55.35	58 26.28		U 32 04 54.2
						24.9

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	^s	°	'	"	["]				h	m
Jan.	0	17	49	44.03	-20	16	50.3	+199.2	0.706 874	+13613	4.72	12.45	11 09.6
	1	17	46	17.52	20	13	31.1	+ 74.3	0.720 487	15358	4.63	12.21	11 02.6
	2	17	43	34.47	20	12	16.8	- 45.8	0.735 845	16804	4.54	11.96	10 56.3
	3	17	41	35.34	20	13	02.6	157.4	0.752 649	17966	4.44	11.69	10 50.7
	4	17	40	19.31	20	15	40.0	257.7	0.770 615	18867	4.33	11.42	10 45.8
	5	17	39	44.62	-20	19	57.7	- 345.4	0.789 482	+19537	4.23	11.15	10 41.6
	6	17	39	48.95	20	25	43.1	419.6	0.809 019	20003	4.13	10.88	10 38.0
	7	17	40	29.62	20	32	42.7	480.0	0.829 022	20291	4.03	10.61	10 35.0
	8	17	41	43.79	20	40	42.7	527.0	0.849 313	20430	3.93	10.36	10 32.6
	9	17	43	28.62	20	49	29.7	561.2	0.869 743	20441	3.84	10.12	10 30.6
	10	17	45	41.37	-20	58	50.9	- 583.2	0.890 184	+20346	3.75	9.89	10 29.0
	11	17	48	19.45	21	08	34.1	594.5	0.910 530	20165	3.67	9.66	10 27.9
	12	17	51	20.45	21	18	28.6	595.4	0.930 695	19911	3.59	9.46	10 27.1
	13	17	54	42.14	21	28	24.0	587.3	0.950 606	19600	3.51	9.26	10 26.7
Feb.	14	17	58	22.51	21	38	11.3	571.1	0.970 206	19243	3.44	9.07	10 26.5
	15	18	02	19.75	-21	47	42.4	- 547.5	0.989 449	+18848	3.38	8.89	10 26.7
	16	18	06	32.20	21	56	49.9	517.3	1.008 297	18427	3.31	8.73	10 27.0
	17	18	10	58.39	22	05	27.2	481.4	1.026 724	17983	3.25	8.57	10 27.6
	18	18	15	37.03	22	13	28.6	440.3	1.044 707	17525	3.20	8.42	10 28.4
	19	18	20	26.90	22	20	48.9	394.6	1.062 232	17054	3.14	8.28	10 29.4
	20	18	25	26.97	-22	27	23.5	- 344.8	1.079 286	+16576	3.09	8.15	10 30.5
	21	18	30	36.29	22	33	08.3	291.5	1.095 862	16094	3.05	8.03	10 31.8
	22	18	35	54.01	22	37	59.8	234.9	1.111 956	15611	3.00	7.91	10 33.2
	23	18	41	19.37	22	41	54.7	175.4	1.127 567	15126	2.96	7.80	10 34.7
	24	18	46	51.69	22	44	50.1	113.5	1.142 693	14645	2.92	7.70	10 36.4
	25	18	52	30.36	-22	46	43.6	- 49.1	1.157 338	+14166	2.89	7.60	10 38.1
	26	18	58	14.82	22	47	32.7	+ 17.2	1.171 504	13689	2.85	7.51	10 40.0
	27	19	04	04.58	22	47	15.5	85.3	1.185 193	13218	2.82	7.42	10 41.9
Feb.	28	19	09	59.18	22	45	50.2	155.1	1.198 411	12750	2.79	7.34	10 43.9
	29	19	15	58.21	22	43	15.1	226.4	1.211 161	12289	2.76	7.27	10 46.0
	30	19	22	01.30	-22	39	28.7	+ 298.9	1.223 450	+11831	2.73	7.19	10 48.1
	31	19	28	08.12	22	34	29.8	372.7	1.235 281	11378	2.70	7.12	10 50.3
	1	19	34	18.35	22	28	17.1	447.5	1.246 659	10930	2.68	7.06	10 52.6
	2	19	40	31.73	22	20	49.6	523.3	1.257 589	10485	2.66	7.00	10 54.9
	3	19	46	47.99	22	12	06.3	600.0	1.268 074	10045	2.63	6.94	10 57.2
	4	19	53	06.90	-22	02	06.3	+ 677.5	1.278 119	+ 9608	2.61	6.89	10 59.6
	5	19	59	28.27	21	50	48.8	755.7	1.287 727	9172	2.59	6.83	11 02.0
	6	20	05	51.89	21	38	13.1	834.6	1.296 899	8738	2.58	6.79	11 04.5
	7	20	12	17.59	21	24	18.5	913.9	1.305 637	8306	2.56	6.74	11 07.0
	8	20	18	45.23	21	09	04.6	994.0	1.313 943	7873	2.54	6.70	11 09.6
	9	20	25	14.65	-20	52	30.6	+1074.4	1.321 816	+ 7440	2.53	6.66	11 12.1
	10	20	31	45.73	20	34	36.2	1155.2	1.329 256	7004	2.51	6.62	11 14.7
Feb.	11	20	38	18.36	20	15	21.0	1236.5	1.336 260	6567	2.50	6.59	11 17.3
	12	20	44	52.43	19	54	44.5	1318.0	1.342 827	6125	2.49	6.55	11 20.0
	13	20	51	27.86	19	32	46.5	1399.9	1.348 952	5679	2.48	6.52	11 22.6
	14	20	58	04.58	-19	09	26.6	+1482.0	1.354 631	+ 5225	2.47	6.50	11 25.3
	15	21	04	42.50	-18	44	44.6		1.359 856		2.46	6.47	11 28.0

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"				
Feb. 15	21	04	42.50	+399.09	-18	44	44.6	+1564.3	1.359 856	2.46	6.47	11 28.0
16	21	11	21.59	400.21	18	18	40.3	1646.8	1.364 622	2.45	6.45	11 30.7
17	21	18	01.80	401.29	17	51	13.5	1729.4	1.368 918	2.44	6.43	11 33.5
18	21	24	43.09	402.35	17	22	24.1	1812.0	1.372 736	2.43	6.41	11 36.2
19	21	31	25.44	403.39	16	52	12.1	1894.9	1.376 061	2.43	6.40	11 39.0
20	21	38	08.83	+404.43	-16	20	37.2	+1977.6	1.378 882	2.42	6.38	11 41.8
21	21	44	53.26	405.47	15	47	39.6	2060.3	1.381 182	2.42	6.37	11 44.6
22	21	51	38.73	406.51	15	13	19.3	2142.8	1.382 943	2.42	6.36	11 47.5
23	21	58	25.24	407.56	14	37	36.5	2225.0	1.384 146	2.41	6.36	11 50.3
24	22	05	12.80	408.63	14	00	31.5	2306.9	1.384 769	2.41	6.35	11 53.2
25	22	12	01.43	+409.70	-13	22	04.6	+2388.4	1.384 786	2.41	6.35	11 56.1
26	22	18	51.13	410.80	12	42	16.2	2469.2	1.384 172	2.41	6.36	11 59.0
27	22	25	41.93	411.90	12	01	07.0	2549.2	1.382 897	2.42	6.36	12 01.9
28	22	32	33.83	412.99	11	18	37.8	2628.2	1.380 927	2.42	6.37	12 04.8
Mar. 1	22	39	26.82	414.08	10	34	49.6	2705.9	1.378 228	2.42	6.39	12 07.8
2	22	46	20.90	+415.15	- 9	49	43.7	+2782.1	1.374 763	2.43	6.40	12 10.7
3	22	53	16.05	416.16	9	03	21.6	2856.2	1.370 490	2.44	6.42	12 13.7
4	23	00	12.21	417.10	8	15	45.4	2928.0	1.365 366	2.45	6.45	12 16.7
5	23	07	09.31	417.93	7	26	57.4	2997.0	1.359 348	2.46	6.47	12 19.8
6	23	14	07.24	418.62	6	37	00.4	3062.4	1.352 386	2.47	6.51	12 22.8
7	23	21	05.86	+419.09	- 5	45	58.0	+3123.7	1.344 434	2.48	6.55	12 25.8
8	23	28	04.95	419.31	4	53	54.3	3180.2	1.335 441	2.50	6.59	12 28.9
9	23	35	04.26	419.17	4	00	54.1	3230.7	1.325 360	2.52	6.64	12 31.9
10	23	42	03.43	418.63	3	07	03.4	3274.5	1.314 145	2.54	6.70	12 35.0
11	23	49	02.06	417.55	2	12	28.9	3310.7	1.301 751	2.57	6.76	12 38.0
12	23	55	59.61	+415.86	- 1	17	18.2	+3337.7	1.288 143	2.59	6.83	12 41.0
13	0	02	55.47	413.43	- 0	21	40.5	3354.9	1.273 290	2.62	6.91	12 44.0
14	0	09	48.90	410.13	+ 0	34	14.4	3360.6	1.257 172	2.66	7.00	12 46.9
15	0	16	39.03	405.85	1	30	15.0	3354.1	1.239 782	2.69	7.10	12 49.8
16	0	23	24.88	400.46	2	26	09.1	3334.0	1.221 127	2.74	7.21	12 52.6
17	0	30	05.34	+393.85	+ 3	21	43.1	+3299.6	1.201 231	2.78	7.33	12 55.3
18	0	36	39.19	385.90	4	16	42.7	3250.1	1.180 137	2.83	7.46	12 57.8
19	0	43	05.09	376.54	5	10	52.8	3185.0	1.157 908	2.88	7.60	13 00.2
20	0	49	21.63	365.68	6	03	57.8	3104.2	1.134 626	2.94	7.76	13 02.5
21	0	55	27.31	353.30	6	55	42.0	3007.5	1.110 393	3.01	7.93	13 04.5
22	1	01	20.61	+339.38	+ 7	45	49.5	+2895.6	1.085 330	3.08	8.11	13 06.3
23	1	06	59.99	323.91	8	34	05.1	2768.9	1.059 571	3.15	8.31	13 07.9
24	1	12	23.90	306.95	9	20	14.0	2628.4	1.033 263	3.23	8.52	13 09.2
25	1	17	30.85	288.57	10	04	02.4	2474.9	1.006 562	3.32	8.74	13 10.2
26	1	22	19.42	268.83	10	45	17.3	2309.6	0.979 629	3.41	8.98	13 10.9
27	1	26	48.25	+247.84	+11	23	46.9	+2133.7	0.952 625	3.51	9.24	13 11.3
28	1	30	56.09	225.74	11	59	20.6	1948.2	0.925 708	3.61	9.51	13 11.3
29	1	34	41.83	202.64	12	31	48.8	1754.2	0.899 034	3.71	9.79	13 10.9
30	1	38	04.47	178.68	13	01	03.0	1552.7	0.872 748	3.83	10.08	13 10.1
31	1	41	03.15	154.02	13	26	55.7	1344.5	0.846 990	3.94	10.39	13 08.9
Apr. 1	1	43	37.17	+128.87	+13	49	20.2	+1130.8	0.821 887	4.06	10.71	13 07.3
2	1	45	46.04		+14	08	11.0		0.797 558	4.19	11.03	13 05.3

MERCURY, 1958
FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Semi- diam- eter	Hor. Paral- ax	Transit, Meridian of Green- wich
		h m s	° ' "		"	"	h m
Apr.	1	1 43 37.17 +128.87	+13 49 20.2 +1130.8	0.821 887 -24329	4.06	10.71	13 07.3
	2	1 45 46.04 103.37	14 08 11.0 912.3	0.797 558 23446	4.19	11.03	13 05.3
	3	1 47 29.41 77.76	14 23 23.3 690.1	0.774 112 22464	4.32	11.37	13 02.8
	4	1 48 47.17 52.28	14 34 53.4 465.1	0.751 648 21395	4.44	11.71	13 00.0
	5	1 49 39.45 27.18	14 42 38.5 238.8	0.730 253 20244	4.57	12.05	12 56.7
	6	1 50 06.63 + 2.72	+14 46 37.3 + 12.4	0.710 009 -19023	4.70	12.39	12 53.0
	7	1 50 09.35 - 20.79	14 46 49.7 - 212.1	0.690 986 17740	4.83	12.74	12 48.9
	8	1 49 48.56 43.05	14 43 17.6 432.8	0.673 246 16404	4.96	13.07	12 44.4
	9	1 49 05.51 63.75	14 36 04.8 647.0	0.656 842 15020	5.08	13.40	12 39.6
	10	1 48 01.76 82.57	14 25 17.8 852.5	0.641 822 13602	5.20	13.71	12 34.4
	11	1 46 39.19 - 99.23	+14 11 05.3 -1046.0	0.628 220 -12154	5.32	14.01	12 29.0
	12	1 44 59.96 113.47	13 53 39.3 1224.6	0.616 066 10688	5.42	14.28	12 23.3
	13	1 43 06.49 125.05	13 33 14.7 1385.2	0.605 378 9211	5.52	14.54	12 17.3
	14	1 41 01.44 133.82	13 10 09.5 1525.2	0.596 167 7734	5.60	14.76	12 11.3
	15	1 38 47.62 139.67	12 44 44.3 1641.6	0.588 433 6266	5.68	14.95	12 05.1
	16	1 36 27.95 -142.56	+12 17 22.7 -1732.7	0.582 167 - 4815	5.74	15.12	11 58.8
	17	1 34 05.39 142.55	11 48 30.0 1797.0	0.577 352 3393	5.78	15.24	11 52.5
	18	1 31 42.84 139.73	11 18 33.0 1833.8	0.573 959 2006	5.82	15.33	11 46.2
	19	1 29 23.11 134.29	10 47 59.2 1843.2	0.571 953 - 661	5.84	15.39	11 40.0
	20	1 27 08.82 126.44	10 17 16.0 1825.9	0.571 292 + 634	5.85	15.40	11 33.9
	21	1 25 02.38 -116.45	+ 9 46 50.1 -1783.5	0.571 926 + 1875	5.84	15.39	11 28.0
	22	1 23 05.93 104.61	9 17 06.6 1718.1	0.573 801 3055	5.82	15.34	11 22.2
	23	1 21 21.32 91.22	8 48 28.5 1631.9	0.576 856 4175	5.79	15.25	11 16.6
	24	1 19 50.10 76.58	8 21 16.6 1527.9	0.581 031 5232	5.75	15.15	11 11.3
	25	1 18 33.52 60.98	7 55 48.7 1409.1	0.586 263 6223	5.70	15.01	11 06.2
	26	1 17 32.54 - 44.69	+ 7 32 19.6 -1277.9	0.592 486 + 7153	5.64	14.85	11 01.4
	27	1 16 47.85 27.93	7 11 01.7 1137.3	0.599 639 8020	5.57	14.68	10 56.9
	28	1 16 19.92 - 10.95	6 52 04.4 990.1	0.607 659 8828	5.50	14.48	10 52.6
	29	1 16 08.97 + 6.10	6 35 34.3 838.2	0.616 487 9578	5.42	14.27	10 48.6
	30	1 16 15.07 23.04	6 21 36.1 683.9	0.626 065 10275	5.33	14.06	10 44.9
May	1	1 16 38.11 + 39.79	+ 6 10 12.2 - 528.7	0.636 340 +10920	5.25	13.83	10 41.5
	2	1 17 17.90 56.21	6 01 23.5 374.2	0.647 260 11518	5.16	13.60	10 38.3
	3	1 18 14.11 72.26	5 55 09.3 221.8	0.658 778 12071	5.07	13.36	10 35.4
	4	1 19 26.37 87.87	5 51 27.5 - 72.2	0.670 849 12585	4.98	13.12	10 32.8
	5	1 20 54.24 103.00	5 50 15.3 + 73.7	0.683 434 13061	4.89	12.88	10 30.5
	6	1 22 37.24 +117.66	+ 5 51 29.0 + 215.3	0.696 495 +13501	4.80	12.63	10 28.3
	7	1 24 34.90 131.82	5 55 04.3 352.4	0.709 996 13911	4.70	12.39	10 26.5
	8	1 26 46.72 145.50	6 00 56.7 484.5	0.723 907 14292	4.61	12.16	10 24.8
	9	1 29 12.22 158.71	6 09 01.2 611.3	0.738 199 14647	4.52	11.92	10 23.4
	10	1 31 50.93 171.48	6 19 12.5 733.0	0.752 846 14978	4.44	11.69	10 22.2
	11	1 34 42.41 +183.83	+ 6 31 25.5 + 849.4	0.767 824 +15288	4.35	11.46	10 21.2
	12	1 37 46.24 195.78	6 45 34.9 960.5	0.783 112 15577	4.27	11.24	10 20.4
	13	1 41 02.02 207.39	7 01 35.4 1066.4	0.798 689 15847	4.18	11.02	10 19.8
	14	1 44 29.41 218.60	7 19 21.8 1167.1	0.814 536 16101	4.10	10.80	10 19.4
	15	1 48 08.10 229.71	7 38 48.9 1262.8	0.830 637 16337	4.02	10.59	10 19.2
	16	1 51 57.81 +240.50	+ 7 59 51.7 +1353.6	0.846 974 +16559	3.94	10.39	10 19.2
	17	1 55 58.31	+ 8 22 25.3	0.863 533	3.87	10.19	10 19.3

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"				h	m
May 17	1	55	58.31	+251.09	+ 8	22	25.3	+1439.3	0.863 533	+16764	3.87	10.19	10 19.3
18	2	00	09.40	261.53	8	46	24.6	1520.3	0.880 297	16954	3.79	10.00	10 19.6
19	2	04	30.93	271.85	9	11	44.9	1596.6	0.897 251	17128	3.72	9.81	10 20.1
20	2	09	02.78	282.09	9	38	21.5	1668.0	0.914 379	17286	3.65	9.62	10 20.8
21	2	13	44.87	292.32	10	06	09.5	1734.9	0.931 665	17427	3.58	9.45	10 21.6
22	2	18	37.19	+302.52	+10	35	04.4	+1796.9	0.949 092	+17548	3.52	9.27	10 22.6
23	2	23	39.71	312.76	11	05	01.3	1854.4	0.966 640	17652	3.46	9.10	10 23.8
24	2	28	52.47	323.09	11	35	55.7	1906.9	0.984 292	17731	3.39	8.94	10 25.1
25	2	34	15.56	333.52	12	07	42.6	1954.6	1.002 023	17786	3.33	8.78	10 26.7
26	2	39	49.08	344.09	12	40	17.2	1997.3	1.019 809	17814	3.28	8.63	10 28.3
27	2	45	33.17	+354.82	+13	13	34.5	+2034.6	1.037 623	+17812	3.22	8.48	10 30.2
28	2	51	27.99	365.73	13	47	29.1	2066.6	1.055 435	17774	3.16	8.34	10 32.3
29	2	57	33.72	376.87	14	21	55.7	2092.7	1.073 209	17697	3.11	8.20	10 34.5
30	3	03	50.59	388.23	14	56	48.4	2112.8	1.090 906	17576	3.06	8.07	10 36.9
31	3	10	18.82	399.81	15	32	01.2	2126.4	1.108 482	17405	3.01	7.94	10 39.6
June 1	3	16	58.63	+411.63	+16	07	27.6	+2133.0	1.125 887	+17181	2.97	7.82	10 42.4
2	3	23	50.26	423.65	16	43	00.6	2132.1	1.143 068	16894	2.92	7.70	10 45.4
3	3	30	53.91	435.89	17	18	32.7	2123.1	1.159 962	16540	2.88	7.59	10 48.6
4	3	38	09.80	448.27	17	53	55.8	2105.6	1.176 502	16112	2.84	7.48	10 52.0
5	3	45	38.07	460.75	18	29	01.4	2078.8	1.192 614	15604	2.80	7.38	10 55.7
6	3	53	18.82	+473.27	+19	03	40.2	+2042.0	1.208 218	+15008	2.76	7.28	10 59.5
7	4	01	12.09	485.71	19	37	42.2	1994.7	1.223 226	14322	2.73	7.19	11 03.5
8	4	09	17.80	498.01	20	10	56.9	1936.2	1.237 548	13541	2.70	7.11	11 07.8
9	4	17	35.81	509.98	20	43	13.1	1866.2	1.251 089	12661	2.67	7.03	11 12.3
10	4	26	05.79	521.51	21	14	19.3	1784.1	1.263 750	11684	2.64	6.96	11 16.9
11	4	34	47.30	+532.44	+21	44	03.4	+1689.8	1.275 434	+10611	2.62	6.90	11 21.8
12	4	43	39.74	542.57	22	12	13.2	1583.3	1.286 045	9446	2.60	6.84	11 26.8
13	4	52	42.31	551.73	22	38	36.5	1465.1	1.295 491	8200	2.58	6.79	11 32.0
14	5	01	54.04	559.77	23	03	01.6	1335.6	1.303 691	6881	2.56	6.75	11 37.4
15	5	11	13.81	566.50	23	25	17.2	1195.6	1.310 572	5504	2.55	6.71	11 42.8
16	5	20	40.31	+571.81	+23	45	12.8	+1046.6	1.316 076	+ 4085	2.54	6.69	11 48.4
17	5	30	12.12	575.56	24	02	39.4	889.7	1.320 161	2642	2.53	6.67	11 54.0
18	5	39	47.68	577.71	24	17	29.1	727.0	1.322 803	+ 1195	2.52	6.65	11 59.7
19	5	49	25.39	578.22	24	29	36.1	559.8	1.323 998	- 238	2.52	6.65	12 05.4
20	5	59	03.61	577.11	24	38	55.9	390.5	1.323 760	1640	2.52	6.65	12 11.1
21	6	08	40.72	+574.43	+24	45	26.4	+ 220.5	1.322 120	- 2994	2.53	6.66	12 16.8
22	6	18	15.15	570.27	24	49	06.9	+ 51.8	1.319 126	4286	2.53	6.67	12 22.4
23	6	27	45.42	564.73	24	49	58.7	- 113.9	1.314 840	5506	2.54	6.69	12 28.0
24	6	37	10.15	557.97	24	48	04.8	275.4	1.309 334	6646	2.55	6.72	12 33.4
25	6	46	28.12	550.12	24	43	29.4	431.6	1.302 688	7700	2.56	6.76	12 38.7
26	6	55	38.24	+541.34	+24	36	17.8	- 581.2	1.294 988	- 8667	2.58	6.80	12 43.9
27	7	04	39.58	531.77	24	26	36.6	723.7	1.286 321	9545	2.60	6.84	12 48.9
28	7	13	31.35	521.55	24	14	32.9	858.7	1.276 776	10339	2.62	6.89	12 53.8
29	7	22	12.90	510.83	24	00	14.2	985.8	1.266 437	11048	2.64	6.95	12 58.4
30	7	30	43.73	499.72	23	43	48.4	1104.5	1.255 389	11680	2.66	7.01	13 02.9
July 1	7	39	03.45	+488.31	+23	25	23.9	-1215.3	1.243 709	-12238	2.69	7.08	13 07.2
2	7	47	11.76		+23	05	08.6		1.231 471		2.71	7.15	13 11.3

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
		h	m	s	s	°	'	"	"			"	"	h	m
July	1	7	39	03.45	+488.31	+23	25	23.9	-1215.3	1.243	709	2.69	7.08	13	07.2
	2	7	47	11.76	476.71	23	05	08.6	1317.8	1.231	471	2.71	7.15	13	11.3
	3	7	55	08.47	465.00	22	43	10.8	1412.4	1.218	743	2.74	7.22	13	15.2
	4	8	02	53.47	453.22	22	19	38.4	1499.3	1.205	588	2.77	7.30	13	18.9
	5	8	10	26.69	441.45	21	54	39.1	1578.7	1.192	061	2.80	7.38	13	22.4
	6	8	17	48.14	+429.69	+21	28	20.4	-1650.6	1.178	215	2.83	7.47	13	25.7
	7	8	24	57.83	418.01	21	00	49.8	1715.8	1.164	094	2.87	7.56	13	28.9
	8	8	31	55.84	406.41	20	32	14.0	1774.1	1.149	741	2.90	7.65	13	31.8
	9	8	38	42.25	394.91	20	02	39.9	1825.9	1.135	192	2.94	7.75	13	34.5
	10	8	45	17.16	383.52	19	32	14.0	1871.6	1.120	479	2.98	7.85	13	37.0
	11	8	51	40.68	+372.23	+19	01	02.4	-1911.2	1.105	632	3.02	7.96	13	39.4
	12	8	57	52.91	361.04	18	29	11.2	1945.1	1.090	675	3.06	8.07	13	41.6
	13	9	03	53.95	349.95	17	56	46.1	1973.4	1.075	632	3.11	8.18	13	43.5
	14	9	09	43.90	338.93	17	23	52.7	1996.3	1.060	521	3.15	8.30	13	45.3
	15	9	15	22.83	327.98	16	50	36.4	2014.1	1.045	362	3.20	8.42	13	46.9
	16	9	20	50.81	+317.06	+16	17	02.3	-2026.5	1.030	168	3.24	8.54	13	48.3
	17	9	26	07.87	306.19	15	43	15.8	2034.0	1.014	956	3.29	8.67	13	49.6
	18	9	31	14.06	295.28	15	09	21.8	2036.5	0.999	736	3.34	8.80	13	50.6
	19	9	36	09.34	284.38	14	35	25.3	2034.0	0.984	522	3.39	8.94	13	51.5
	20	9	40	53.72	273.38	14	01	31.3	2026.7	0.969	324	3.45	9.08	13	52.2
	21	9	45	27.10	+262.32	+13	27	44.6	-2014.3	0.954	152	3.50	9.22	13	52.7
	22	9	49	49.42	251.13	12	54	10.3	1996.9	0.939	017	3.56	9.37	13	53.0
	23	9	54	00.55	239.77	12	20	53.4	1974.6	0.923	930	3.61	9.52	13	53.2
	24	9	58	00.32	228.24	11	47	58.8	1947.0	0.908	900	3.67	9.68	13	53.1
	25	10	01	48.56	216.48	11	15	31.8	1914.1	0.893	938	3.74	9.84	13	52.9
	26	10	05	25.04	+204.46	+10	43	37.7	-1875.8	0.879	057	3.80	10.01	13	52.4
	27	10	08	49.50	192.13	10	12	21.9	1831.9	0.864	269	3.86	10.18	13	51.7
	28	10	12	01.63	179.46	9	41	50.0	1781.9	0.849	587	3.93	10.36	13	50.9
	29	10	15	01.09	166.42	9	12	08.1	1726.0	0.835	026	4.00	10.54	13	49.8
	30	10	17	47.51	152.96	8	43	22.1	1663.6	0.820	604	4.07	10.72	13	48.5
Aug.	31	10	20	20.47	+139.05	+ 8	15	38.5	-1594.5	0.806	338	4.14	10.91	13	47.0
	1	10	22	39.52	124.66	7	49	04.0	1518.2	0.792	250	4.22	11.11	13	45.2
	2	10	24	44.18	109.74	7	23	45.8	1434.5	0.778	363	4.29	11.31	13	43.2
	3	10	26	33.92	94.28	6	59	51.3	1343.2	0.764	702	4.37	11.51	13	41.0
	4	10	28	08.20	78.27	6	37	28.1	1243.5	0.751	299	4.45	11.71	13	38.5
	5	10	29	26.47	+ 61.67	+ 6	16	44.6	-1135.5	0.738	186	4.52	11.92	13	35.7
	6	10	30	28.14	44.54	5	57	49.1	1018.5	0.725	400	4.60	12.13	13	32.6
	7	10	31	12.68	26.86	5	40	50.6	892.8	0.712	984	4.68	12.34	13	29.2
	8	10	31	39.54	+ 8.69	5	25	57.8	757.6	0.700	982	4.76	12.55	13	25.6
	9	10	31	48.23	- 9.91	5	13	20.2	613.5	0.689	448	4.84	12.76	13	21.6
	10	10	31	38.32	- 28.80	+ 5	03	06.7	- 460.5	0.678	439	4.92	12.97	13	17.4
	11	10	31	09.52	47.89	4	55	26.2	298.9	0.668	017	5.00	13.17	13	12.8
	12	10	30	21.63	66.99	4	50	27.3	- 129.6	0.658	251	5.07	13.37	13	07.9
	13	10	29	14.64	85.85	4	48	17.7	+ 46.4	0.649	215	5.14	13.55	13	02.7
	14	10	27	48.79	104.24	4	49	04.1	227.5	0.640	990	5.21	13.73	12	57.1
	15	10	26	04.55	-121.83	+ 4	52	51.6	+ 411.8	0.633	661	5.27	13.89	12	51.3
	16	10	24	02.72		+ 4	59	43.4		0.627	318	5.32	14.03	12	45.2

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi-diameter	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s	°	'	"	"				
Aug. 16	10	24	02.72	-138.26	+ 4	59	43.4	+ 596.8	0.627 318	- 5263	5.32	12 45.2
17	10	21	44.46	153.15	5	09	40.2	779.7	0.622 055	4087	5.37	12 38.9
18	10	19	11.31	166.06	5	22	39.9	956.9	0.617 968	2814	5.40	12 32.3
19	10	16	25.25	176.57	5	38	36.8	1124.9	0.615 154	- 1446	5.43	12 25.5
20	10	13	28.68	184.26	5	57	21.7	1279.8	0.613 708	+ 17	5.44	12 18.6
21	10	10	24.42	-188.74	+ 6	18	41.5	+1417.6	0.613 725	+ 1563	5.44	12 11.6
22	10	07	15.68	189.68	6	42	19.1	1534.6	0.615 288	3190	5.43	12 04.5
23	10	04	06.00	186.81	7	07	53.7	1627.7	0.618 478	4883	5.40	11 57.5
24	10	00	59.19	180.01	7	35	01.4	1693.8	0.623 361	6630	5.36	11 50.5
25	9	57	59.18	169.21	8	03	15.2	1731.3	0.629 991	8418	5.30	11 43.6
26	9	55	09.97	-154.50	+ 8	32	06.5	+1739.2	0.638 409	+10227	5.23	11 37.0
27	9	52	35.47	136.06	9	01	05.7	1717.0	0.648 636	12041	5.15	11 30.7
28	9	50	19.41	114.20	9	29	42.7	1665.8	0.660 677	13842	5.06	11 24.7
29	9	48	25.21	89.29	9	57	28.5	1586.8	0.674 519	15611	4.95	11 19.0
30	9	46	55.92	61.77	10	23	55.3	1481.7	0.690 130	17329	4.84	11 13.8
31	9	45	54.15	- 32.14	+10	48	37.0	+1353.3	0.707 459	+18976	4.72	11 09.1
Sept. 1	9	45	22.01	- 0.92	11	11	10.3	1203.9	0.726 435	20537	4.60	11 04.9
2	9	45	21.09	+ 31.39	11	31	14.2	1036.1	0.746 972	21991	4.47	11 01.2
3	9	45	52.48	64.26	11	48	30.3	852.8	0.768 963	23324	4.34	10 58.0
4	9	46	56.74	97.21	12	02	43.1	656.7	0.792 287	24519	4.22	10 55.4
5	9	48	33.95	+129.79	+12	13	39.8	+ 450.1	0.816 806	+25560	4.09	10 53.3
6	9	50	43.74	161.59	12	21	09.9	235.7	0.842 366	26436	3.97	10 51.8
7	9	53	25.33	192.20	12	25	05.6	+ 16.0	0.868 802	27132	3.84	10 50.8
8	9	56	37.53	221.29	12	25	21.6	- 206.5	0.895 934	27642	3.73	10 50.3
9	10	00	18.82	248.58	12	21	55.1	429.6	0.923 576	27957	3.62	10 50.2
10	10	04	27.40	+273.84	+12	14	45.5	- 650.6	0.951 533	+28079	3.51	10 50.6
11	10	09	01.24	296.87	12	03	54.9	867.5	0.979 612	28004	3.41	10 51.4
12	10	13	58.11	317.53	11	49	27.4	1077.8	1.007 616	27743	3.31	10 52.6
13	10	19	15.64	335.79	11	31	29.6	1279.8	1.035 359	27302	3.23	10 54.1
14	10	24	51.43	351.64	11	10	09.8	1471.2	1.062 661	26698	3.14	10 55.8
15	10	30	43.07	+365.09	+10	45	38.6	-1650.8	1.089 359	+25947	3.07	10 57.9
16	10	36	48.16	376.27	10	18	07.8	1817.6	1.115 306	25069	2.99	11 00.1
17	10	43	04.43	385.33	9	47	50.2	1970.2	1.140 375	24085	2.93	11 02.5
18	10	49	29.76	392.40	9	15	00.0	2108.8	1.164 460	23019	2.87	11 05.1
19	10	56	02.16	397.70	8	39	51.2	2232.6	1.187 479	21888	2.81	11 07.7
20	11	02	39.86	+401.43	+ 8	02	38.6	-2342.3	1.209 367	+20715	2.76	11 10.4
21	11	09	21.29	403.79	7	23	36.3	2437.9	1.230 082	19518	2.72	11 13.2
22	11	16	05.08	405.00	6	42	58.4	2520.5	1.249 600	18310	2.67	11 16.0
23	11	22	50.08	405.21	6	00	57.9	2590.5	1.267 910	17108	2.63	11 18.8
24	11	29	35.29	404.64	5	17	47.4	2648.7	1.285 018	15921	2.60	11 21.6
25	11	36	19.93	+403.41	+ 4	33	38.7	-2696.4	1.300 939	+14757	2.57	11 24.4
26	11	43	03.34	401.69	3	48	42.3	2734.0	1.315 696	13623	2.54	11 27.2
27	11	49	45.03	399.58	3	03	08.3	2762.9	1.329 319	12524	2.51	11 29.9
28	11	56	24.61	397.21	2	17	05.4	2783.7	1.341 843	11463	2.49	11 32.6
29	12	03	01.82	394.65	1	30	41.7	2797.3	1.353 306	10442	2.47	11 35.3
30	12	09	36.47	+391.97	+ 0	44	04.4	-2804.3	1.363 748	+ 9461	2.45	11 37.9
Oct. 1	12	16	08.44		- 0	02	39.9		1.373 209		2.43	11 40.5

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
		h m s s	° ' " "		"	"	h m
Oct.	1	12 16 08.44 +389.26	- 0 02 39.9 -2805.6	1.373 209 + 8519	2.43	6.41	11 40.5
	2	12 22 37.70 386.53	0 49 25.5 2801.6	1.381 728 7617	2.42	6.37	11 43.0
	3	12 29 04.23 383.86	1 36 07.1 2793.2	1.389 345 6752	2.40	6.33	11 45.5
	4	12 35 28.09 381.25	2 22 40.3 2780.6	1.396 097 5923	2.39	6.30	11 48.0
	5	12 41 49.34 378.75	3 09 00.9 2764.3	1.402 020 5128	2.38	6.28	11 50.3
	6	12 48 08.09 +376.37	- 3 55 05.2 -2744.7	1.407 148 + 4366	2.37	6.25	11 52.7
	7	12 54 24.46 374.12	4 40 49.9 2722.1	1.411 514 3632	2.37	6.23	11 55.0
	8	13 00 38.58 372.01	5 26 12.0 2697.0	1.415 146 2925	2.36	6.22	11 57.3
	9	13 06 50.59 370.06	6 11 09.0 2669.4	1.418 071 2246	2.36	6.21	11 59.5
	10	13 13 00.65 368.25	6 55 38.4 2639.7	1.420 317 1587	2.35	6.20	12 01.7
	11	13 19 08.90 +366.61	- 7 39 38.1 -2607.9	1.421 904 + 952	2.35	6.19	12 03.9
	12	13 25 15.51 365.11	8 23 06.0 2574.3	1.422 856 + 334	2.35	6.18	12 06.1
	13	13 31 20.62 363.77	9 06 00.3 2538.9	1.423 190 - 265	2.35	6.18	12 08.2
	14	13 37 24.39 362.58	9 48 19.2 2502.1	1.422 925 850	2.35	6.18	12 10.3
	15	13 43 26.97 361.53	10 30 01.3 2463.7	1.422 075 1420	2.35	6.19	12 12.4
	16	13 49 28.50 +360.62	-11 11 05.0 -2424.0	1.420 655 - 1978	2.35	6.19	12 14.5
	17	13 55 29.12 359.84	11 51 29.0 2382.7	1.418 677 2525	2.35	6.20	12 16.6
	18	14 01 28.96 359.19	12 31 11.7 2340.4	1.416 152 3062	2.36	6.21	12 18.6
	19	14 07 28.15 358.65	13 10 12.1 2296.6	1.413 090 3592	2.36	6.23	12 20.7
	20	14 13 26.80 358.25	13 48 28.7 2251.7	1.409 498 4114	2.37	6.24	12 22.7
	21	14 19 25.05 +357.91	-14 26 00.4 -2205.6	1.405 384 - 4632	2.38	6.26	12 24.7
	22	14 25 22.96 357.70	15 02 46.0 2158.3	1.400 752 5144	2.38	6.28	12 26.8
	23	14 31 20.66 357.55	15 38 44.3 2109.7	1.395 608 5654	2.39	6.31	12 28.8
	24	14 37 18.21 357.48	16 13 54.0 2060.0	1.389 954 6162	2.40	6.33	12 30.8
	25	14 43 15.69 357.46	16 48 14.0 2008.9	1.383 792 6669	2.41	6.36	12 32.8
	26	14 49 13.15 +357.47	-17 21 42.9 -1956.8	1.377 123 - 7176	2.43	6.39	12 34.8
	27	14 55 10.62 357.53	17 54 19.7 1903.4	1.369 947 7684	2.44	6.42	12 36.8
	28	15 01 08.15 357.59	18 26 03.1 1848.6	1.362 263 8194	2.45	6.46	12 38.9
	29	15 07 05.74 357.63	18 56 51.7 1792.6	1.354 069 8706	2.47	6.50	12 40.9
	30	15 13 03.37 357.65	19 26 44.3 1735.2	1.345 363 9222	2.48	6.54	12 42.9
Nov.	31	15 19 01.02 +357.62	-19 55 39.5 -1676.4	1.336 141 - 9741	2.50	6.59	12 44.9
	1	15 24 58.64 357.51	20 23 35.9 1616.3	1.326 400 10267	2.52	6.63	12 47.0
	2	15 30 56.15 357.30	20 50 32.2 1554.6	1.316 133 10797	2.54	6.69	12 49.0
	3	15 36 53.45 356.94	21 16 26.8 1491.5	1.305 336 11333	2.56	6.74	12 51.0
	4	15 42 50.39 356.43	21 41 18.3 1427.0	1.294 003 11876	2.58	6.80	12 53.0
	5	15 48 46.82 +355.70	-22 05 05.3 -1360.7	1.282 127 -12426	2.61	6.86	12 55.0
	6	15 54 42.52 354.73	22 27 46.0 1293.0	1.269 701 12983	2.63	6.93	12 57.0
	7	16 00 37.25 353.45	22 49 19.0 1223.7	1.256 718 13547	2.66	7.00	12 58.9
	8	16 06 30.70 351.84	23 09 42.7 1152.6	1.243 171 14119	2.69	7.08	13 00.9
	9	16 12 22.54 349.81	23 28 55.3 1080.0	1.229 052 14696	2.72	7.16	13 02.8
	10	16 18 12.35 +347.30	-23 46 55.3 -1005.6	1.214 356 -15281	2.75	7.25	13 04.6
	11	16 23 59.65 344.24	24 03 40.9 929.5	1.199 075 15872	2.79	7.34	13 06.5
	12	16 29 43.89 340.55	24 19 10.4 851.8	1.183 203 16466	2.82	7.44	13 08.2
	13	16 35 24.44 336.13	24 33 22.2 772.3	1.166 737 17064	2.86	7.54	13 09.9
	14	16 41 00.57 330.88	24 46 14.5 691.2	1.149 673 17661	2.91	7.65	13 11.5
	15	16 46 31.45 +324.06	-24 57 45.7 - 608.3	1.132 012 -18258	2.95	7.77	13 13.0
	16	16 51 56.11	-25 07 54.0	1.113 754	3.00	7.90	13 14.5

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"			"	"	h	m
Nov. 16	16	51	56.11	+317.38	-25	07	54.0	- 523.9	1.113 754	-18848	3.00	7.90	13	14.5
17	16	57	13.49	308.85	25	16	37.9	437.8	1.094 906	19430	3.05	8.04	13	15.7
18	17	02	22.34	298.94	25	23	55.7	350.2	1.075 476	19996	3.11	8.18	13	16.8
19	17	07	21.28	287.43	25	29	45.9	261.1	1.055 480	20542	3.16	8.34	13	17.8
20	17	12	08.71	274.15	25	34	07.0	170.5	1.034 938	21058	3.23	8.50	13	18.5
21	17	16	42.86	+258.85	-25	36	57.5	- 78.7	1.013 880	-21538	3.29	8.68	13	19.0
22	17	21	01.71	241.32	25	38	16.2	+ 14.7	0.992 342	21966	3.37	8.87	13	19.2
23	17	25	03.03	221.28	25	38	01.5	109.3	0.970 376	22331	3.44	9.07	13	19.1
24	17	28	44.31	198.49	25	36	12.2	205.1	0.948 045	22618	3.52	9.28	13	18.7
25	17	32	02.80	172.70	25	32	47.1	302.5	0.925 427	22804	3.61	9.51	13	17.8
26	17	34	55.50	+143.66	-25	27	44.6	+ 401.1	0.902 623	-22872	3.70	9.75	13	16.5
27	17	37	19.16	111.21	25	21	03.5	501.6	0.879 751	22794	3.80	10.00	13	14.6
28	17	39	10.37	75.27	25	12	41.9	603.7	0.856 957	22543	3.90	10.27	13	12.2
29	17	40	25.64	+ 35.83	25	02	38.2	708.0	0.834 414	22089	4.00	10.55	13	09.2
30	17	41	01.47	- 6.84	24	50	50.2	814.3	0.812 325	21400	4.11	10.83	13	05.5
Dec. 1	17	40	54.63	- 52.29	-24	37	15.9	+ 922.7	0.790 925	-20446	4.22	11.13	13	01.0
2	17	40	02.34	99.68	24	21	53.2	1032.5	0.770 479	19199	4.33	11.42	12	55.8
3	17	38	22.66	147.85	24	04	40.7	1142.5	0.751 280	17635	4.45	11.71	12	49.8
4	17	35	54.81	195.19	23	45	38.2	1250.0	0.733 645	15741	4.55	11.99	12	43.0
5	17	32	39.62	239.72	23	24	48.2	1351.2	0.717 904	13516	4.65	12.26	12	35.4
6	17	28	39.90	-279.25	-23	02	17.0	+1440.5	0.704 388	-10979	4.74	12.49	12	27.2
7	17	24	00.65	311.45	22	38	16.5	1510.7	0.693 409	8169	4.82	12.69	12	18.3
8	17	18	49.20	334.27	22	13	05.8	1554.4	0.685 240	5141	4.87	12.84	12	09.1
9	17	13	14.93	346.17	21	47	11.4	1563.5	0.680 099	- 1973	4.91	12.94	11	59.5
10	17	07	28.76	346.32	21	21	07.9	1532.6	0.678 126	+ 1245	4.93	12.98	11	49.8
11	17	01	42.44	-334.88	-20	55	35.3	+1459.0	0.679 371	+ 4421	4.92	12.95	11	40.2
12	16	56	07.56	312.83	20	31	16.3	1343.6	0.683 792	7463	4.88	12.87	11	30.9
13	16	50	54.73	281.85	20	08	52.7	1191.3	0.691 255	10295	4.83	12.73	11	22.1
14	16	46	12.88	244.08	19	49	01.4	1010.3	0.701 550	12857	4.76	12.54	11	13.8
15	16	42	08.80	201.72	19	32	11.1	809.8	0.714 407	15108	4.68	12.32	11	06.1
16	16	38	47.08	-156.95	-19	18	41.3	+ 600.1	0.729 515	+17030	4.58	12.06	10	59.2
17	16	36	10.13	111.51	19	08	41.2	390.1	0.746 545	18621	4.47	11.79	10	53.0
18	16	34	18.62	66.88	19	02	11.1	+ 187.5	0.765 166	19895	4.37	11.50	10	47.5
19	16	33	11.74	- 24.10	18	59	03.6	- 1.8	0.785 061	20872	4.25	11.21	10	42.8
20	16	32	47.64	+ 16.17	18	59	05.4	174.1	0.805 933	21580	4.14	10.92	10	38.8
21	16	33	03.81	+ 53.52	-19	01	59.5	- 327.0	0.827 513	+22054	4.04	10.63	10	35.4
22	16	33	57.33	87.81	19	07	26.5	459.9	0.849 567	22321	3.93	10.36	10	32.6
23	16	35	25.14	119.00	19	15	06.4	572.4	0.871 888	22413	3.83	10.09	10	30.4
24	16	37	24.14	147.26	19	24	38.8	665.6	0.894 301	22359	3.73	9.84	10	28.6
25	16	39	51.40	172.71	19	35	44.4	740.4	0.916 660	22182	3.64	9.60	10	27.3
26	16	42	44.11	+195.59	-19	48	04.8	- 798.5	0.938 842	+21907	3.56	9.37	10	26.5
27	16	45	59.70	216.15	20	01	23.3	841.1	0.960 749	21550	3.48	9.16	10	25.9
28	16	49	35.85	234.59	20	15	24.4	870.0	0.982 299	21130	3.40	8.96	10	25.7
29	16	53	30.44	251.15	20	29	54.4	886.3	1.003 429	20659	3.33	8.77	10	25.8
30	16	57	41.59	266.02	20	44	40.7	891.8	1.024 088	20149	3.26	8.59	10	26.2
31	17	02	07.61	+279.41	-20	59	32.5	- 887.2	1.044 237	+19611	3.20	8.43	10	26.8
32	17	06	47.02		-21	14	19.7		1.063 848		3.14	8.27	10	27.6

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Date		Heliocentric Longitude, Mean Equinox of Date		Reduction to Orbit	Heliocentric Latitude		Logarithm of Radius Vector	
		° ' " ° ' "	' "		° ' " ' "			
Jan.	0	124 45 48.9	5 36 44.2	+ 5 39.2	+6 49 27.3	+ 7 15.8	9.513 1292	
	1	130 22 33.1	5 27 28.1	3 18.1	6 56 43.1	+ 3 15.9	9.519 0896	+59604
	2	135 50 01.2	5 17 55.3	+ 0 53.7	6 59 59.0	- 0 26.1	9.525 3976	63080
	3	141 07 56.5	5 08 15.2	- 1 28.4	6 59 32.9	3 48.8	9.531 9707	65731
	4	146 16 11.7	4 58 36.1	3 43.4	6 55 44.1	6 51.1	9.538 7322	67615
	5	151 14 47.8	4 49 05.0	- 5 47.4	+6 48 53.0	- 9 32.8	9.545 6117	68795
	6	156 03 52.8	4 39 47.2	7 37.7	6 39 20.2	11 54.7	9.552 5463	+69346
	7	160 43 40.0	4 30 47.4	9 12.3	6 27 25.5	13 57.8	9.559 4799	69336
	8	165 14 27.4	4 22 08.6	10 30.0	6 13 27.7	15 43.2	9.566 3640	68841
	9	169 36 36.0	4 13 53.3	11 30.5	5 57 44.5	17 12.6	9.573 1567	67927
	10	173 50 29.3	4 06 02.6	-12 13.9	+5 40 31.9	-18 27.5	9.579 8224	66657
	11	177 56 31.9	3 58 37.7	12 40.8	5 22 04.4	19 29.2	9.586 3311	+65087
	12	181 55 09.6	3 51 38.7	12 52.0	5 02 35.2	20 19.5	9.592 6581	63270
	13	185 46 48.3	3 45 05.6	12 48.7	4 42 15.7	20 59.6	9.598 7826	61245
	14	189 31 53.9	3 38 57.7	12 32.1	4 21 16.1	21 30.7	9.604 6881	59055
	15	193 10 51.6	3 33 14.7	-12 03.6	+3 59 45.4	-21 54.1	9.610 3613	56732
	16	196 44 06.3	3 27 55.8	11 24.5	3 37 51.3	22 10.7	9.615 7917	+54304
	17	200 12 02.1	3 22 59.8	10 36.2	3 15 40.6	22 21.5	9.620 9712	51795
	18	203 35 01.9	3 18 26.2	9 40.0	2 53 19.1	22 27.3	9.625 8934	49222
	19	206 53 28.1	3 14 13.7	8 37.2	2 30 51.8	22 28.6	9.630 5541	46607
	20	210 07 41.8	3 10 21.6	- 7 29.0	+2 08 23.2	-22 26.3	9.634 9496	43955
	21	213 18 03.4	3 06 48.9	6 16.5	1 45 56.9	22 20.6	9.639 0784	+41288
	22	216 24 52.3	3 03 34.7	5 00.9	1 23 36.3	22 12.4	9.642 9387	38603
	23	219 28 27.0	3 00 38.2	3 43.0	1 01 23.9	22 01.5	9.646 5305	35918
	24	222 29 05.2	2 57 58.6	2 23.9	0 39 22.4	21 48.7	9.649 8534	33229
	25	225 27 03.8	2 55 35.3	- 1 04.4	+0 17 33.7	-21 34.0	9.652 9078	30544
	26	228 22 39.1	2 53 27.5	+ 0 14.7	-0 04 00.3	21 17.7	9.655 6946	+27868
	27	231 16 06.6	2 51 34.6	1 32.7	0 25 18.0	20 59.9	9.658 2143	25197
	28	234 07 41.2	2 49 56.2	2 49.0	0 46 17.9	20 40.8	9.660 4680	22537
	29	236 57 37.4	2 48 31.8	4 02.8	1 06 58.7	20 20.6	9.662 4570	19890
	30	239 46 09.2	2 47 20.8	+ 5 13.7	-1 27 19.3	-19 59.2	9.664 1820	17250
	31	242 33 30.0	2 46 23.0	6 21.0	1 47 18.5	19 36.8	9.665 6439	+14619
Feb.	1	245 19 53.0	2 45 38.2	7 24.4	2 06 55.3	19 13.4	9.666 8437	11998
	2	248 05 31.2	2 45 05.9	8 23.3	2 26 08.7	18 48.8	9.667 7818	9381
	3	250 50 37.1	2 44 46.1	9 17.3	2 44 57.5	18 23.3	9.668 4594	6776
	4	253 35 23.2	2 44 38.6	+10 06.1	-3 03 20.8	-17 56.6	9.668 8766	4172
	5	256 20 01.8	2 44 43.3	10 49.2	3 21 17.4	17 28.8	9.669 0335	+ 1569
	6	259 04 45.1	2 45 00.3	11 26.3	3 38 46.2	16 59.9	9.668 9306	- 1029
	7	261 49 45.4	2 45 29.4	11 57.2	3 55 46.1	16 29.6	9.668 5674	3632
	8	264 35 14.8	2 46 10.9	12 21.5	4 12 15.7	15 57.8	9.667 9440	6234
	9	267 21 25.7	2 47 04.7	+12 38.9	-4 28 13.5	-15 24.6	9.667 0600	8840
	10	270 08 30.4	2 48 11.2	12 49.3	4 43 38.1	14 49.7	9.665 9147	-11453
	11	272 56 41.6	2 49 30.4	12 52.5	4 58 27.8	14 12.8	9.664 5072	14075
	12	275 46 12.0	2 51 02.7	12 48.1	5 12 40.6	13 34.0	9.662 8371	16701
	13	278 37 14.7	2 52 48.4	12 36.2	5 26 14.6	12 52.9	9.660 9032	19339
	14	281 30 03.1	2 54 48.0	+12 16.6	-5 39 07.5	-12 09.3	9.658 7044	21988
	15	284 24 51.1		+11 49.2	-5 51 16.8		9.656 2399	-24645

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date		Reduction to Orbit	Heliocentric Latitude		Logarithm of Radius Vector	
		° ' "	° ' "	' "	° ' "	' "		
Feb.	15	284 24 51.1	2 57 01.6	+11 49.2	-5 51 16.8	-11 23.0	9.656 2399	-27311
	16	287 21 52.7	2 59 30.0	11 14.0	6 02 39.8	10 33.5	9.653 5088	29988
	17	290 21 22.7	3 02 13.5	10 31.1	6 13 13.3	9 40.9	9.650 5100	32670
	18	293 23 36.2	3 05 12.8	9 40.5	6 22 54.2	8 44.4	9.647 2430	35358
	19	296 28 49.0	3 08 28.4	8 42.5	6 31 38.6	7 44.0	9.643 7072	38048
	20	299 37 17.4	3 12 01.1	+ 7 37.3	-6 39 22.6	- 6 39.1	9.639 9024	-40730
	21	302 49 18.5	3 15 51.4	6 25.3	6 46 01.7	5 29.4	9.635 8294	43403
	22	306 05 09.9	3 20 00.1	5 07.0	6 51 31.1	4 14.3	9.631 4891	46057
	23	309 25 10.0	3 24 27.9	3 42.9	6 55 45.4	2 53.5	9.626 8834	48683
	24	312 49 37.9	3 29 15.5	2 13.9	6 58 38.9	- 1 26.6	9.622 0151	51265
	25	316 18 53.4	3 34 23.6	+ 0 40.8	-7 00 05.5	+ 0 07.3	9.616 8886	-53788
	26	319 53 17.0	3 39 52.7	- 0 55.1	6 59 58.2	1 48.1	9.611 5098	56235
	27	323 33 09.7	3 45 43.8	2 32.6	6 58 10.1	3 36.8	9.605 8863	58584
	28	327 18 53.5	3 51 56.8	4 10.1	6 54 33.3	5 33.4	9.600 0279	60804
Mar.	1	331 10 50.3	3 58 32.4	5 45.8	6 48 59.9	7 38.5	9.593 9475	62864
	2	335 09 22.7	4 05 30.5	- 7 17.8	-6 41 21.4	+ 9 52.0	9.587 6611	-64729
	3	339 14 53.2	4 12 50.8	8 43.7	6 31 29.4	12 14.3	9.581 1882	66354
	4	343 27 44.0	4 20 33.1	10 01.1	6 19 15.1	14 45.0	9.574 5528	67690
	5	347 48 17.1	4 28 36.0	11 07.3	6 04 30.1	17 23.8	9.567 7838	68682
	6	352 16 53.1	4 36 58.1	11 59.7	5 47 06.3	20 09.6	9.560 9156	69270
	7	356 53 51.2	4 45 37.1	-12 35.4	-5 26 56.7	+23 01.3	9.553 9886	-69385
	8	1 39 28.3	4 54 29.8	12 51.7	5 03 55.4	25 57.2	9.547 0501	68960
	9	6 33 58.1	5 03 32.5	12 46.3	4 37 58.2	28 54.4	9.540 1541	67915
	10	11 37 30.6	5 12 40.1	12 17.2	4 09 03.8	31 50.0	9.533 3626	66183
	11	16 50 10.7	5 21 46.6	11 23.3	3 37 13.8	34 40.3	9.526 7443	63695
	12	22 11 57.3	5 30 44.7	-10 04.1	-3 02 33.5	+37 20.1	9.520 3748	-60394
	13	27 42 42.0	5 39 26.3	8 20.5	2 25 13.4	39 44.8	9.514 3354	56237
	14	33 22 08.3	5 47 41.8	6 15.0	1 45 28.6	41 48.3	9.508 7117	51202
	15	39 09 50.1	5 55 21.4	3 51.1	1 03 40.3	43 24.8	9.503 5915	45291
	16	45 05 11.5	6 02 14.4	- 1 14.3	-0 20 15.5	44 28.9	9.499 0624	38553
	17	51 07 25.9	6 08 10.2	+ 1 28.8	+0 24 13.4	+44 55.4	9.495 2071	-31059
	18	57 15 36.1	6 12 58.5	4 10.4	1 09 08.8	44 40.5	9.492 1012	22918
	19	63 28 34.6	6 16 30.6	6 42.4	1 53 49.3	43 42.2	9.489 8094	14287
	20	69 45 05.2	6 18 38.9	8 56.4	2 37 31.5	42 00.0	9.488 3807	- 5333
	21	76 03 44.1	6 19 18.7	10 45.1	3 19 31.5	39 35.9	9.487 8474	+ 3737
	22	82 23 02.8	6 18 27.3	+12 02.6	+3 59 07.4	+36 33.7	9.488 2211	+12724
	23	88 41 30.1	6 16 05.8	12 44.8	4 35 41.1	32 59.2	9.489 4935	21426
	24	94 57 35.9	6 12 17.6	12 50.1	5 08 40.3	28 59.4	9.491 6361	29664
	25	101 09 53.5	6 07 09.2	12 19.3	5 37 39.7	24 41.9	9.494 6025	37283
	26	107 17 02.7	6 00 49.3	11 15.1	6 02 21.6	20 15.1	9.498 3308	44162
	27	113 17 52.0	5 53 28.0	+ 9 42.2	+6 22 36.7	+15 46.1	9.502 7470	+50221
	28	119 11 20.0	5 45 16.8	7 46.7	6 38 22.8	11 21.9	9.507 7691	55413
	29	124 56 36.8	5 36 27.1	5 34.9	6 49 44.7	7 08.0	9.513 3104	59724
	30	130 33 03.9	5 27 10.4	3 13.7	6 56 52.7	+ 3 08.8	9.519 2828	63173
	31	136 00 14.3	5 17 37.2	+ 0 49.2	7 00 01.5	- 0 32.8	9.525 6001	65800
Apr.	1	141 17 51.5	5 07 57.0	- 1 32.8	+6 59 28.7	- 3 54.8	9.532 1801	+67662
	2	146 25 48.5		- 3 47.5	+6 55 33.9		9.538 9463	

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date		Reduction to Orbit	Heliocentric Latitude		Logarithm of Radius Vector	
		° ' " ° ' "	' "		° ' " ' "			
Apr.	1	141 17 51.5	5 07 57.0	- 1 32.8	+6 59 28.7	- 3 54.8	9.532 1801	+67662
	2	146 25 48.5	4 58 18.2	3 47.5	6 55 33.9	6 56.4	9.538 9463	68819
	3	151 24 06.7	4 48 47.3	5 51.1	6 48 37.5	9 37.5	9.545 8282	69350
	4	156 12 54.0	4 39 30.1	7 40.9	6 39 00.0	11 58.8	9.552 7632	69326
	5	160 52 24.1	4 30 30.8	9 14.9	6 27 01.2	14 01.3	9.559 6958	68819
	6	165 22 54.9	4 21 52.9	-10 32.1	+6 12 59.9	-15 46.3	9.566 5777	+67890
	7	169 44 47.8	4 13 38.2	11 32.1	5 57 13.6	17 15.1	9.573 3667	66611
	8	173 58 26.0	4 05 48.4	12 15.0	5 39 58.5	18 29.6	9.580 0278	65034
	9	178 04 14.4	3 58 24.3	12 41.3	5 21 28.9	19 31.0	9.586 5312	63208
	10	182 02 38.7	3 51 26.1	12 52.1	5 01 57.9	20 20.9	9.592 8520	61177
	11	185 54 04.8	3 44 53.7	-12 48.4	+4 41 37.0	-21 00.7	9.598 9697	+58985
	12	189 38 58.5	3 38 46.7	12 31.4	4 20 36.3	21 31.5	9.604 8682	56658
	13	193 17 45.2	3 33 04.5	12 02.5	3 59 04.8	21 54.7	9.610 5340	54226
	14	196 50 49.7	3 27 46.2	11 23.1	3 37 10.1	22 11.1	9.615 9566	51716
	15	200 18 35.9	3 22 51.1	10 34.6	3 14 59.0	22 21.8	9.621 1282	49141
	16	203 41 27.0	3 18 18.0	- 9 38.1	+2 52 37.2	-22 27.3	9.626 0423	+46523
	17	206 59 45.0	3 14 06.2	8 35.1	2 30 09.9	22 28.7	9.630 6946	43873
	18	210 13 51.2	3 10 14.8	7 26.8	2 07 41.2	22 26.1	9.635 0819	41204
	19	213 24 06.0	3 06 42.6	6 14.2	1 45 15.1	22 20.5	9.639 2023	38521
	20	216 30 48.6	3 03 28.9	4 58.5	1 22 54.6	22 12.0	9.643 0544	35834
	21	219 34 17.5	3 00 33.1	- 3 40.6	+1 00 42.6	-22 01.2	9.646 6378	+33145
	22	222 34 50.6	2 57 53.9	2 21.5	0 38 41.4	21 48.3	9.649 9523	30462
	23	225 32 44.5	2 55 31.1	- 1 02.0	+0 16 53.1	21 33.5	9.652 9985	27784
	24	228 28 15.6	2 53 23.8	+ 0 17.2	-0 04 40.4	21 17.1	9.655 7769	25114
	25	231 21 39.4	2 51 31.4	1 35.1	0 25 57.5	20 59.3	9.658 2883	22456
	26	234 13 10.8	2 49 53.4	+ 2 51.3	-0 46 56.8	-20 40.3	9.660 5339	+19806
	27	237 03 04.2	2 48 29.4	4 05.1	1 07 37.1	20 19.9	9.662 5145	17168
	28	239 51 33.6	2 47 18.8	5 15.8	1 27 57.0	19 58.6	9.664 2313	14538
	29	242 38 52.4	2 46 21.5	6 23.1	1 47 55.6	19 36.1	9.665 6851	11919
	30	245 25 13.9	2 45 36.9	7 26.3	2 07 31 7	19 12.5	9.666 8770	9301
May	1	248 10 50.8	2 45 05.1	+ 8 25.0	-2 26 44.2	-18 48.1	9.667 8071	+ 6695
	2	250 55 55.9	2 44 45.7	9 18.9	2 45 32.3	18 22.4	9.668 4766	4089
	3	253 40 41.6	2 44 38.6	10 07.5	3 03 54.7	17 55.8	9.668 8855	+ 1489
	4	256 25 20.2	2 44 43.7	10 50.4	3 21 50.5	17 28.0	9.669 0344	- 1109
	5	259 10 03.9	2 45 01.0	11 27.4	3 39 18.5	16 58.9	9.668 9235	3710
	6	261 55 04.9	2 45 30.5	+11 58.0	-3 56 17.4	-16 28.6	9.668 5525	- 6313
	7	264 40 35.4	2 46 12.4	12 22.1	4 12 46.0	15 56.9	9.667 9212	8920
	8	267 26 47.8	2 47 06.6	12 39.4	4 28 42.9	15 23.5	9.667 0292	11534
	9	270 13 54.4	2 48 13.4	12 49.5	4 44 06.4	14 48.6	9.665 8758	14154
	10	273 02 07.8	2 49 33.1	12 52.4	4 58 55.0	14 11.6	9.664 4604	16783
	11	275 51 40.9	2 51 05.7	+12 47.9	-5 13 06.6	-13 32.8	9.662 7821	-19420
	12	278 42 46.6	2 52 51.9	12 35.7	5 26 39.4	12 51.6	9.660 8401	22068
	13	281 35 38.5	2 54 51.9	12 15.9	5 39 31.0	12 07.9	9.658 6333	24726
	14	284 30 30.4	2 57 05.9	11 48.2	5 51 38.9	11 21.4	9.656 1607	27393
	15	287 27 36.3	2 59 34.8	11 12.8	6 03 00.3	10 32.0	9.653 4214	30070
	16	290 27 11.1	3 02 18.8	+10 29.6	-6 13 32.3	- 9 39.1	9.650 4144	-32752
	17	293 29 29.9		+ 9 38.9	-6 23 11.4		9.647 1392	

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Date		Heliocentric Longitude, Mean Equinox of Date				Reduction to Orbit	Heliocentric Latitude				Logarithm of Radius Vector		
		°	'	"	°	'	"	°	'	"			
May	17	293	29	29.9	3 05	18.5	+ 9	38.9	-6 23	11.4	- 8 42.6	9.647 1392	-35440
	18	296	34	48.4	3 08	34.7	8	40.6	6 31	54.0	7 42.0	9.643 5952	38126
	19	299	43	23.1	3 12	07.9	7	35.2	6 39	36.0	6 37.0	9.639 7826	40811
	20	302	55	31.0	3 15	58.7	6	23.0	6 46	13.0	5 27.2	9.635 7015	43484
	21	306	11	29.7	3 20	08.0	5	04.4	6 51	40.2	4 11.9	9.631 3531	46138
	22	309	31	37.7	3 24	36.3	+ 3	40.2	-6 55	52.1	- 2 50.9	9.626 7393	-48760
	23	312	56	14.0	3 29	24.6	2	11.0	6 58	43.0	- 1 23.7	9.621 8633	51340
	24	316	25	38.6	3 34	33.3	+ 0	37.9	7 00	06.7	+ 0 10.3	9.616 7293	53864
	25	320	00	11.9	3 40	03.1	- 0	58.1	6 59	56.4	1 51.4	9.611 3429	56307
	26	323	40	15.0	3 45	54.7	2	35.6	6 58	05.0	3 40.2	9.605 7122	58650
	27	327	26	09.7	3 52	08.5	- 4	13.1	-6 54	24.8	+ 5 37.2	9.599 8472	-60866
	28	331	18	18.2	3 58	44.7	5	48.7	6 48	47.6	7 42.4	9.593 7606	62921
	29	335	17	02.9	4 05	43.4	7	20.5	6 41	05.2	9 56.3	9.587 4685	64780
	30	339	22	46.3	4 13	04.5	8	46.2	6 31	08.9	12 18.9	9.580 9905	66395
	31	343	35	50.8	4 20	47.4	10	03.3	6 18	50.0	14 49.8	9.574 3510	67724
June	1	347	56	38.2	4 28	50.8	-11	09.2	-6 04	00.2	+17 28.7	9.567 5786	-68704
	2	352	25	29.0	4 37	13.5	12	01.0	5 46	31.5	20 14.8	9.560 7082	69280
	3	357	02	42.5	4 45	52.8	12	36.2	5 26	16.7	23 06.7	9.553 7802	69378
	4	1	48	35.3	4 54	46.0	12	51.9	5 03	10.0	26 02.5	9.546 8424	68932
	5	6	43	21.3	5 03	48.9	12	45.8	4 37	07.5	28 59.8	9.539 9492	67869
	6	11	47	10.2	5 12	56.4	-12	16.0	-4 08	07.7	+31 55.4	9.533 1623	-66117
	7	17	00	06.6	5 22	02.8	11	21.2	3 36	12.3	34 45.3	9.526 5506	63602
	8	22	22	09.4	5 31	00.5	10	01.2	3 01	27.0	37 24.8	9.520 1904	60280
	9	27	53	09.9	5 39	41.4	8	17.0	2 24	02.2	39 48.9	9.514 1624	56095
	10	33	32	51.3	5 47	56.0	6	10.8	1 44	13.3	41 51.5	9.508 5529	51033
	11	39	20	47.3	5 55	34.2	- 3	46.5	-1 02	21.8	+43 27.3	9.503 4496	-45101
	12	45	16	21.5	6 02	25.7	- 1	09.4	-0 18	54.5	44 30.2	9.498 9395	38338
	13	51	18	47.2	6 08	19.5	+ 1	33.8	+0 25	35.7	44 55.5	9.495 1057	30818
	14	57	27	06.7	6 13	05.8	4	15.3	1 10	31.2	44 39.3	9.492 0239	22663
	15	63	40	12.5	6 16	35.3	6	46.8	1 55	10.5	43 39.7	9.489 7576	14018
	16	69	56	47.8	6 18	41.1	+ 9	00.1	+2 38	50.2	+41 56.2	9.488 3558	- 5060
	17	76	15	28.9	6 19	18.0	10	48.0	3 20	46.4	39 30.8	9.487 8498	+ 4008
	18	82	34	46.9	6 18	24.0	12	04.4	4 00	17.2	36 27.6	9.488 2506	12989
	19	88	53	10.9	6 15	59.8	12	45.5	4 36	44.8	32 52.2	9.489 5495	21682
	20	95	09	10.7	6 12	09.1	12	49.7	5 09	37.0	28 51.7	9.491 7177	29901
	21	101	21	19.8	6 06	58.5	+12	17.8	+5 38	28.7	+24 33.9	9.494 7078	+37501
	22	107	28	18.3	6 00	36.5	11	12.7	6 03	02.6	20 06.8	9.498 4579	44355
	23	113	28	54.8	5 53	13.6	9	39.0	6 23	09.4	15 38.0	9.502 8934	50388
	24	119	22	08.4	5 45	01.0	7	42.9	6 38	47.4	11 14.0	9.507 9322	55552
	25	125	07	09.4	5 36	10.5	5	30.7	6 50	01.4	7 00.5	9.513 4874	59836
	26	130	43	19.9	5 26	53.1	+ 3	09.3	+6 57	01.9	+ 3 01.8	9.519 4710	+63262
	27	136	10	13.0	5 17	19.7	+ 0	44.8	7 00	03.7	- 0 39.2	9.525 7972	65865
	28	141	27	32.7	5 07	39.4	- 1	37.0	6 59	24.5	4 00.7	9.532 3837	67704
	29	146	35	12.1	4 58	00.7	3	51.4	6 55	23.8	7 01.6	9.539 1541	68841
	30	151	33	12.8	4 48	30.2	5	54.7	6 48	22.2	9 42.1	9.546 0382	69355
July	1	156	21	43.0	4 39	13.6	- 7	44.0	+6 38	40.1	-12 02.8	9.552 9737	+69315
	2	161	00	56.6			- 9	17.5	+6 26	37.3		9.559 9052	

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Date		Heliocentric Longitude, Mean Equinox of Date		Reduction to Orbit	Heliocentric Latitude		Logarithm of Radius Vector	
		° ' "	° ' "	' "	° ' "	' "		
July	1	156 21 43.0	4 39 13.6	- 7 44.0	+6 38 40.1	-12 02.8	9.552 9737	+69315
	2	161 00 56.6	4 30 14.9	9 17.5	6 26 37.3	14 04.8	9.559 9052	68795
	3	165 31 11.5	4 21 37.5	10 34.2	6 12 32.5	15 49.2	9.566 7847	67854
	4	169 52 49.0	4 13 23.7	11 33.7	5 56 43.3	17 17.6	9.573 5701	66566
	5	174 06 12.7	4 05 34.7	12 16.0	5 39 25.7	18 31.7	9.580 2267	64982
	6	178 11 47.4	3 58 11.3	-12 41.9	+5 20 54.0	-19 32.6	9.586 7249	+63147
	7	182 09 58.7	3 51 13.9	12 52.2	5 01 21.4	20 22.3	9.593 0396	61113
	8	186 01 12.6	3 44 42.3	12 48.0	4 40 59.1	21 01.8	9.599 1509	58914
	9	189 45 54.9	3 38 36.1	12 30.7	4 19 57.3	21 32.4	9.605 0423	56585
	10	193 24 31.0	3 32 54.6	12 01.5	3 58 24.9	21 55.3	9.610 7008	54153
	11	196 57 25.6	3 27 37.0	-11 21.8	+3 36 29.6	-22 11.5	9.616 1161	+51635
	12	200 25 02.6	3 22 42.5	10 32.9	3 14 18.1	22 22.1	9.621 2796	49062
	13	203 47 45.1	3 18 10.2	9 36.3	2 51 56.0	22 27.4	9.626 1858	46443
	14	207 05 55.3	3 13 59.1	8 33.1	2 29 28.6	22 28.6	9.630 8301	43793
	15	210 19 54.4	3 10 08.1	7 24.6	2 07 00.0	22 26.1	9.635 2094	41121
	16	213 30 02.5	3 06 36.5	- 6 11.9	+1 44 33.9	-22 20.2	9.639 3215	+35440
	17	216 36 39.0	3 03 23.5	4 56.1	1 22 13.7	22 11.8	9.643 1655	35752
	18	219 40 02.5	3 00 28.1	3 38.2	1 00 01.9	22 00.8	9.646 7407	33063
	19	222 40 30.6	2 57 49.5	2 19.0	0 38 01.1	21 47.9	9.650 0470	30381
	20	225 38 20.1	2 55 27.1	- 0 59.5	+0 16 13.2	21 33.0	9.653 0851	27703
	21	228 33 47.2	2 53 20.3	+ 0 19.6	-0 05 19.8	-21 16.7	9.655 8554	+25034
	22	231 27 07.5	2 51 28.3	1 37.5	0 26 36.5	20 58.7	9.658 3588	22377
	23	234 18 35.8	2 49 50.7	2 53.6	0 47 35.2	20 39.7	9.660 5965	19726
	24	237 08 26.5	2 48 27.1	4 07.3	1 08 14.9	20 19.3	9.662 5691	17086
	25	239 56 53.6	2 47 17.0	5 17.9	1 28 34.2	19 57.9	9.664 2777	14460
	26	242 44 10.6	2 46 20.0	+ 6 25.1	-1 48 32.1	-19 35.4	9.665 7237	+11839
	27	245 30 30.6	2 45 35.9	7 28.2	2 08 07.5	19 11.8	9.666 9076	9223
	28	248 16 06.5	2 45 04.5	8 26.8	2 27 19.3	18 47.3	9.667 8299	6615
	29	251 01 11.0	2 44 45.3	9 20.5	2 46 06.6	18 21.7	9.668 4914	4011
	30	253 45 56.3	2 44 38.6	10 08.9	3 04 28.3	17 55.0	9.668 8925	+ 1413
Aug.	31	256 30 34.9	2 44 44.1	+10 51.6	-3 22 23.3	-17 27.0	9.669 0338	- 1188
	1	259 15 19.0	2 45 01.8	11 28.4	3 39 50.3	16 58.1	9.668 9150	3789
	2	262 00 20.8	2 45 31.7	11 58.9	3 56 48.4	16 27.6	9.668 5361	6392
	3	264 45 52.5	2 46 13.9	12 22.8	4 13 16.0	15 55.9	9.667 8969	8998
	4	267 32 06.4	2 47 08.5	12 39.8	4 29 11.9	15 22.5	9.666 9971	11614
	5	270 19 14.9	2 48 15.6	+12 49.7	-4 44 34.4	-14 47.4	9.665 8357	-14232
	6	273 07 30.5	2 49 35.7	12 52.4	4 59 21.8	14 10.5	9.664 4125	16861
	7	275 57 06.2	2 51 08.9	12 47.6	5 13 32.3	13 31.5	9.662 7264	19501
	8	278 48 15.1	2 52 55.4	12 35.2	5 27 03.8	12 50.3	9.660 7763	22148
	9	281 41 10.5	2 54 55.7	12 15.1	5 39 54.1	12 06.5	9.658 5615	24807
	10	284 36 06.2	2 57 10.3	+11 47.2	-5 52 00.6	-11 19.9	9.656 0808	-27473
	11	287 33 16.5	2 59 39.5	11 11.6	6 03 20.5	10 30.5	9.653 3335	30150
	12	290 32 56.0	3 02 24.0	10 28.2	6 13 51.0	9 37.4	9.650 3185	32834
	13	293 35 20.0	3 05 24.3	9 37.1	6 23 28.4	8 40.8	9.647 0351	35521
	14	296 40 44.3	3 08 40.9	8 38.7	6 32 09.2	7 40.1	9.643 4830	38209
	15	299 49 25.2	3 12 14.6	+ 7 33.1	-6 39 49.3	- 6 34.9	9.639 6621	-40892
	16	303 01 39.8		+ 6 20.6	-6 46 24.2		9.635 5729	

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Date		Heliocentric Longitude, Mean Equinox of Date				Reduction to Orbit		Heliocentric Latitude				Logarithm of Radius Vector									
		°	'	"	°	'	"	'	"	°	'	"									
Aug.	16	303	01	39.8	3	16	06.1	+	6	20.6	-	6	46	24.2	9.635	5729	-43565				
	17	306	17	45.9	3	20	15.8		5	01.9	6	51	49.1	-	5	24.9	9.631	2164	46216		
	18	309	38	01.7	3	24	44.9		3	37.5	6	55	58.6		4	09.5	9.626	5948	48839		
	19	313	02	46.6	3	29	33.6		2	08.2	6	58	46.9		2	48.3	9.621	7109	51417		
	20	316	32	20.2	3	34	43.0	+	0	35.0	7	00	07.8	-	1	20.9	9.616	5692	53939		
														+	0	13.2					
	21	320	07	03.2	3	40	13.4	-	1	01.1	-	6	59	54.6		1	54.7	9.611	1753	-56380	
	22	323	47	16.6	3	46	05.8		2	38.6	6	57	59.9		3	43.7	9.605	5373	58720		
	23	327	33	22.4	3	52	20.2		4	16.1	6	54	16.2		5	40.9	9.599	6653	60931		
	24	331	25	42.6	3	58	57.1		5	51.6	6	48	35.3		7	46.4	9.593	5722	62980		
	25	335	24	39.7	4	05	56.5		7	23.3	6	40	48.9		10	00.6	9.587	2742	64834		
	26	339	30	36.2	4	13	18.3	-	8	48.7	-	6	30	48.3		12	23.3	9.580	7908	-66441	
	27	343	43	54.5	4	21	01.7		10	05.5	6	18	25.0		14	54.5	9.574	1467	67759		
	28	348	04	56.2	4	29	05.9		11	11.0	6	03	30.5		17	33.8	9.567	3708	68729		
	29	352	34	02.1	4	37	29.0		12	02.4	5	45	56.7		20	19.9	9.560	4979	69288		
	30	357	11	31.1	4	46	08.9		12	37.0	5	25	36.8		23	12.1	9.553	5691	69374		
	31	1	57	40.0	4	55	02.3	-	12	52.0	-	5	02	24.7		26	07.9	9.546	6317	-68911	
	Sept.	1	6	52	42.3	5	04	05.5		12	45.2	4	36	16.8		29	05.2	9.539	7406	67826	
		2	11	56	47.8	5	13	13.2		12	14.7	4	07	11.6		32	00.7	9.532	9580	66052	
3		17	10	01.0	5	22	19.3		11	19.1	3	35	10.9		34	50.3	9.526	3528	63517		
4		22	32	20.3	5	31	16.6		9	58.4	3	00	20.6		37	29.5	9.520	0011	60164		
5		28	03	36.9	5	39	56.9	-	8	13.4	-	2	22	51.1		39	53.0	9.513	9847	-55953	
6		33	43	33.8	5	48	10.5		6	06.6	1	42	58.1		41	54.9	9.508	3894	50864		
7		39	31	44.3	5	55	47.6		3	41.8	1	01	03.2		43	29.7	9.503	3030	44906		
8		45	27	31.9	6	02	37.4	-	1	04.4	-	0	17	33.5		44	31.5	9.498	8124	38119	
9		51	30	09.3	6	08	29.3	+	1	38.8	+	0	26	58.0		44	55.7	9.495	0005	30581	
10		57	38	38.6	6	13	13.3	+	4	20.1	+	1	11	53.7		44	38.1	9.491	9424	-22407	
11		63	51	51.9	6	16	40.5		6	51.2	1	56	31.8		43	37.2	9.489	7017	13750		
12		70	08	32.4	6	18	43.5		9	03.9	2	40	09.0		41	52.3	9.488	3267	- 4785		
13		76	27	15.9	6	19	17.8		10	50.8	3	22	01.3		39	25.8	9.487	8482	+ 4283		
14		82	46	33.7	6	18	21.0		12	06.2	4	01	27.1		36	21.5	9.488	2765	13259		
15		89	04	54.7	6	15	54.1	+	12	46.2	+	4	37	48.6		32	45.1	9.489	6024	+21938	
16		95	20	48.8	6	12	00.9		12	49.3	5	10	33.7		28	44.1	9.491	7962	30142		
17		101	32	49.7	6	06	47.9		12	16.3	5	39	17.8		24	25.8	9.494	8104	37720		
18		107	39	37.6	6	00	23.9		11	10.2	6	03	43.6		19	58.6	9.498	5824	44551		
19		113	40	01.5	5	52	59.3		9	35.8	6	23	42.2		15	29.7	9.503	0375	50559		
20		119	33	00.8	5	44	45.5	+	7	39.0	+	6	39	11.9		11	06.1	9.508	0934	+55695	
21		125	17	46.3	5	35	53.9		5	26.5	6	50	18.0		6	53.0	9.513	6629	59955		
22		130	53	40.2	5	26	35.9		3	04.8	6	57	11.0		+	2	54.7	9.519	6584	63353	
23		136	20	16.1	5	17	02.1	+	0	40.4	7	00	05.7		-	0	45.7	9.525	9937	65933	
24		141	37	18.2	5	07	21.8	-	1	41.2	6	59	20.0		4	06.5	9.532	5870	67747		
25		146	44	40.0	4	57	43.2	-	3	55.4	+	6	55	13.5		-	7	06.8	9.539	3617	+68867
26		151	42	23.2	4	48	13.0		5	58.2	6	48	06.7		9	46.8	9.546	2484	69363		
27		156	30	36.2	4	38	56.9		7	47.1	6	38	19.9		12	06.9	9.553	1847	69308		
28		161	09	33.1	4	29	58.9		9	20.1	6	26	13.0		14	08.2	9.560	1155	68771		
29		165	39	32.0	4	21	22.2		10	36.3	6	12	04.8		15	52.1	9.566	9926	67822		
30		170	00	54.2	4	13	09.0	-	11	35.2	+	5	56	12.7		-17	20.2	9.573	7748	+66524	
Oct.		1	174	14	03.2				-	12	17.1	+	5	38	52.5				9.580	4272	

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Date		Heliocentric Longitude, Mean Equinox of Date		Reduction to Orbit	Heliocentric Latitude		Logarithm of Radius Vector	
		° ' " ° ' "	° ' " ° ' "	' "	° ' " ° ' "	' "		
Oct.	1	174 14 03.2	4 05 20.7	-12 17.1	+5 38 52.5	-18 33.7	9.580 4272	+64928
	2	178 19 23.9	3 57 58.2	12 42.4	5 20 18.8	19 34.4	9.586 9200	63089
	3	182 17 22.1	3 51 01.7	12 52.3	5 00 44.4	20 23.6	9.593 2289	61049
	4	186 08 23.8	3 44 30.7	12 47.7	4 40 20.8	21 02.8	9.599 3338	58846
	5	189 52 54.5	3 38 25.3	12 30.0	4 19 18.0	21 33.3	9.605 2184	56515
	6	193 31 19.8	3 32 44.5	-12 00.4	+3 57 44.7	-21 55.9	9.610 8699	+54075
	7	197 04 04.3	3 27 27.7	11 20.4	3 35 48.8	22 11.9	9.616 2774	51560
	8	200 31 32.0	3 22 33.9	10 31.3	3 13 36.9	22 22.3	9.621 4334	48983
	9	203 54 05.9	3 18 02.1	9 34.4	2 51 14.6	22 27.6	9.626 3317	46364
	10	207 12 08.0	3 13 51.7	8 31.1	2 28 47.0	22 28.6	9.630 9681	43711
	11	210 25 59.7	3 10 01.3	- 7 22.4	+2 06 18.4	-22 25.9	9.635 3392	+41040
	12	213 36 01.0	3 06 30.3	6 09.6	1 43 52.5	22 20.0	9.639 4432	38359
	13	216 42 31.3	3 03 17.9	4 53.7	1 21 32.5	22 11.5	9.643 2791	35670
	14	219 45 49.2	3 00 22.9	3 35.8	0 59 21.0	22 00.5	9.646 8461	32985
	15	222 46 12.1	2 57 44.9	2 16.6	0 37 20.5	21 47.4	9.650 1446	30298
	16	225 43 57.0	2 55 22.9	- 0 57.1	+0 15 33.1	-21 32.5	9.653 1744	+27619
	17	228 39 19.9	2 53 16.6	+ 0 22.0	-0 05 59.4	21 16.1	9.655 9363	24955
	18	231 32 36.5	2 51 25.0	1 39.9	0 27 15.5	20 58.2	9.658 4318	22296
	19	234 24 01.5	2 49 48.0	2 55.9	0 48 13.7	20 39.1	9.660 6614	19648
	20	237 13 49.5	2 48 24.6	4 09.5	1 08 52.8	20 18.7	9.662 6262	17008
	21	240 02 14.1	2 47 15.0	+ 5 20.1	-1 29 11.5	-19 57.2	9.664 3270	+14378
	22	242 49 29.1	2 46 18.4	6 27.1	1 49 08.7	19 34.6	9.665 7648	11758
	23	245 35 47.5	2 45 34.7	7 30.0	2 08 43.3	19 11.1	9.666 9406	9144
	24	248 21 22.2	2 45 03.6	8 28.5	2 27 54.4	18 46.5	9.667 8550	6536
	25	251 06 25.8	2 44 44.9	9 22.0	2 46 40.9	18 20.9	9.668 5086	3934
	26	253 51 10.7	2 44 38.5	+10 10.3	-3 05 01.8	-17 54.1	9.668 9020	+ 1331
	27	256 35 49.2	2 44 44.4	10 52.9	3 22 55.9	17 26.2	9.669 0351	- 1268
	28	259 20 33.6	2 45 02.5	11 29.4	3 40 22.1	16 57.1	9.668 9083	3868
	29	262 05 36.1	2 45 32.7	11 59.7	3 57 19.2	16 26.7	9.668 5215	6472
	30	264 51 08.8	2 46 15.3	12 23.4	4 13 45.9	15 54.9	9.667 8743	9079
	31	267 37 24.1	2 47 10.3	+12 40.2	-4 29 40.8	-15 21.4	9.666 9664	-11694
Nov.	1	270 24 34.4	2 48 17.8	12 49.9	4 45 02.2	14 46.3	9.665 7970	14313
	2	273 12 52.2	2 49 38.3	12 52.4	4 59 48.5	14 09.3	9.664 3657	16942
	3	276 02 30.5	2 51 11.8	12 47.3	5 13 57.8	13 30.3	9.662 6715	19582
	4	278 53 42.3	2 52 58.8	12 34.7	5 27 28.1	12 49.0	9.660 7133	22230
	5	281 46 41.1	2 54 59.6	+12 14.4	-5 40 17.1	-12 05.1	9.658 4903	-24889
	6	284 41 40.7	2 57 14.5	11 46.3	5 52 22.2	11 18.5	9.656 0014	27555
	7	287 38 55.2	2 59 44.3	11 10.4	6 03 40.7	10 28.8	9.653 2459	30233
	8	290 38 39.5	3 02 29.2	10 26.7	6 14 09.5	9 35.7	9.650 2226	32917
	9	293 41 08.7	3 05 30.0	9 35.5	6 23 45.2	8 39.0	9.646 9309	35605
	10	296 46 38.7	3 08 47.2	+ 8 36.8	-6 32 24.2	- 7 38.2	9.643 3704	-38292
	11	299 55 25.9	3 12 21.4	7 30.9	6 40 02.4	6 32.8	9.639 5412	40977
	12	303 07 47.3	3 16 13.3	6 18.3	6 46 35.2	5 22.7	9.635 4435	43647
	13	306 24 00.6	3 20 23.8	4 59.4	6 51 57.9	4 07.1	9.631 0788	46299
	14	309 44 24.4	3 24 53.3	3 34.8	6 56 05.0	2 45.7	9.626 4489	48920
	15	313 09 17.7	3 29 42.8	+ 2 05.4	-6 58 50.7	- 1 18.2	9.621 5569	-51499
	16	316 39 00.5		+ 0 32.1	-7 00 08.9		9.616 4070	

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Date	Heliocentric Longitude, Mean Equinox of Date			Reduction to Orbit	Heliocentric Latitude			Logarithm of Radius Vector	
	°	'	"	'	°	'	"		
Nov. 16	316	39	00.5	+ 0 32.1	-7 00	08.9		9.616	4070
17	320	13	53.3	- 1 04.1	6 59	52.6	+ 0 16.3	9.611	0052 -54018
18	323	54	17.2	2 41.6	6 57	54.7	1 57.9	9.605	3597 56455
19	327	40	34.1	4 19.0	6 54	07.5	3 47.2	9.599	4804 58793
20	331	33	06.2	5 54.5	6 48	22.9	5 44.6	9.593	3806 60998
			3 59 09.7				7 50.4		63043
21	335	32	15.9	- 7 26.0	-6 40	32.5		9.587	0763
22	339	38	25.7	8 51.2	6 30	27.7	+10 04.8	9.580	5873 -64890
23	343	51	58.0	10 07.7	6 17	59.9	12 27.8	9.573	9383 66490
24	348	13	14.4	11 12.8	6 03	00.6	14 59.3	9.567	1586 67797
25	352	42	35.5	12 03.7	5 45	21.8	17 38.8	9.560	2830 68756
			4 37 44.9				20 25.2		69302
26	357	20	20.4	-12 37.7	-5 24	56.6		9.553	3528
27	2 06	45.7	4 46 25.3	12 52.2	5 01	39.2	+23 17.4	9.546	4156 -69372
28	7 02	04.9	4 55 19.2	12 44.6	4 35	25.8	26 13.4	9.539	5265 68891
29	12 06	27.4	5 04 22.5	12 13.3	4 06	15.1	29 10.7	9.532	7478 67787
30	17 19	57.8	5 13 30.4	11 17.0	3 34	09.1	32 06.0	9.526	1489 65989
			5 22 36.3				34 55.4		63429
Dec. 1	22 42	34.1	5 31 33.4	- 9 55.5	-2 59	13.7		9.519	8060
2	28 14	07.5	5 40 12.9	8 09.8	2 21	39.5	+37 34.2	9.513	8007 -60053
3	33 54	20.4	5 48 25.7	6 02.4	1 41	42.4	39 57.1	9.508	2193 55814
4	39 42	46.1	5 56 01.4	3 37.1	0 59	44.0	41 58.4	9.503	1495 50698
5	45 38	47.5	6 02 49.7	- 0 59.4	-0 16	11.8	43 32.2	9.498	6783 44712
							44 32.9		37898
6	51 41	37.2	6 08 39.7	+ 1 43.9	+0 28	21.1		9.494	8885
7	57 50	16.9	6 13 21.5	4 25.0	1 13	16.9	+44 55.8	9.491	8547 -30338
8	64 03	38.4	6 16 46.1	6 55.6	1 57	53.9	44 37.0	9.489	6400 22147
9	70 20	24.5	6 18 46.5	9 07.6	2 41	28.5	43 34.6	9.488	2924 13476
10	76 39	11.0	6 19 17.9	10 53.7	3 23	17.0	41 48.5	9.487	8418 - 4506
							39 20.7		+ 4567
11	82 58	28.9	6 18 18.4	+12 08.0	+4 02	37.7		9.488	2985
12	89 16	47.3	6 15 48.6	12 46.9	4 38	52.9	+36 15.2	9.489	6519 +13534
13	95 32	35.9	6 11 52.8	12 48.8	5 11	31.0	32 38.1	9.491	8722 22203
14	101 44	28.7	6 06 37.5	12 14.7	5 40	07.3	28 36.3	9.494	9113 30391
15	107 51	06.2	6 00 11.4	11 07.6	6 04	24.9	24 17.6	9.498	7059 37946
							19 50.3		44754
16	113 51	17.6	5 52 45.1	+ 9 32.5	+6 24	15.2		9.503	1813
17	119 44	02.7	5 44 29.8	7 35.1	6 39	36.6	+15 21.4	9.508	2548 +50735
18	125 28	32.5	5 35 37.2	5 22.2	6 50	34.6	10 58.0	9.513	8393 55845
19	131 04	09.7	5 26 18.5	3 00.4	6 57	19.9	6 45.3	9.519	8470 60077
20	136 30	28.2	5 16 44.3	+ 0 35.9	7 00	07.5	+ 2 47.6	9.526	1919 63449
							- 0 52.3		66003
21	141 47	12.5	5 07 03.9	- 1 45.6	+6 59	15.2		9.532	7922
22	146 54	16.4	4 57 25.4	3 59.4	6 55	02.8	- 4 12.4	9.539	5720 +67798
23	151 51	41.8	4 47 55.6	6 01.9	6 47	50.7	7 12.1	9.546	4616 68896
24	156 39	37.4	4 38 39.9	7 50.3	6 37	59.3	9 51.4	9.553	3988 69372
25	161 18	17.3	4 29 42.5	9 22.8	6 25	48.3	12 11.0	9.560	3288 69300
							14 11.7		68750
26	165 47	59.8	4 21 06.5	-10 38.4	+6 11	36.6		9.567	2038
27	170 09	06.3	4 12 54.1	11 36.8	5 55	41.4	-15 55.2	9.573	9828 +67790
28	174 22	00.4	4 05 06.6	12 18.1	5 38	18.8	17 22.6	9.580	6310 66482
29	178 27	07.0	3 57 44.8	12 43.0	5 19	43.0	18 35.8	9.587	1187 64877
30	182 24	51.8	3 50 49.1	12 52.4	5 00	06.9	19 36.1	9.593	4217 63030
							20 25.0		60985
31	186 15	40.9	3 44 18.9	-12 47.3	+4 39	41.9		9.599	5202
32	189 59	59.8		-12 29.2	+4 18	38.0	-21 03.9	9.605	3980 +58778

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
		h	m	s		°	'	"				"	"	h m
Jan.	0	21	09	08.40		-15	43	55.0		0.365	603		23.00	14 30.7
	1	21	10	02.89	+ 54.49	15	27	18.7	+996.3	0.359	729	-5874	23.38	14 27.6
	2	21	10	48.51	45.62	15	10	59.1	979.6	0.353	969	5760	23.76	14 24.3
	3	21	11	25.07	36.56	14	54	57.8	961.3	0.348	330	5639	24.14	14 20.9
	4	21	11	52.36	27.29	14	39	16.7	941.1	0.342	819	5511	24.53	14 17.3
					17.82				918.7			5376		
	5	21	12	10.18		-14	23	58.0		0.337	443		24.92	14 13.6
	6	21	12	18.40	+ 8.22	14	09	03.2	+894.8	0.332	210	-5233	25.32	14 09.7
	7	21	12	16.87	- 1.53	13	54	34.2	869.0	0.327	128	5082	25.71	14 05.7
	8	21	12	05.47	11.40	13	40	32.8	841.4	0.322	203	4925	26.10	14 01.4
	9	21	11	44.15	21.32	13	27	00.7	812.1	0.317	446	4757	26.49	13 57.1
					31.29				780.7			4583		
	10	21	11	12.86		-13	14	00.0		0.312	863		26.88	13 52.5
	11	21	10	31.59	- 41.27	13	01	32.1	+747.9	0.308	463	-4400	27.26	13 47.8
	12	21	09	40.37	51.22	12	49	39.0	713.1	0.304	254	4209	27.64	13 42.9
	13	21	08	39.31	61.06	12	38	22.1	676.9	0.300	245	4009	28.01	13 37.9
	14	21	07	28.55	70.76	12	27	43.1	639.0	0.296	443	3802	28.37	13 32.7
					80.27				599.6			3585		
	15	21	06	08.28		-12	17	43.5		0.292	858		28.72	13 27.4
	16	21	04	38.77	- 89.51	12	08	24.7	+558.8	0.289	497	-3361	29.05	13 21.9
	17	21	03	00.33	98.44	11	59	48.1	516.6	0.286	368	3129	29.37	13 16.2
	18	21	01	13.36	106.97	11	51	54.5	473.6	0.283	480	2888	29.67	13 10.4
	19	20	59	18.32	115.04	11	44	45.4	429.1	0.280	840	2640	29.95	13 04.5
					122.58				384.4			2385		
	20	20	57	15.74		-11	38	21.0		0.278	455		30.20	12 58.5
	21	20	55	06.25	-129.49	11	32	42.3	+338.7	0.276	332	-2123	30.43	12 52.4
	22	20	52	50.53	135.72	11	27	49.3	293.0	0.274	479	1853	30.64	12 46.1
	23	20	50	29.31	141.22	11	23	42.3	247.0	0.272	901	1578	30.82	12 39.8
	24	20	48	03.45	145.86	11	20	21.2	201.1	0.271	604	1297	30.96	12 33.5
					149.64				155.8			1013		
	25	20	45	33.81		-11	17	45.4		0.270	591		31.08	12 27.0
	26	20	43	01.33	-152.48	11	15	54.2	+111.2	0.269	868	- 723	31.16	12 20.5
	27	20	40	26.98	154.35	11	14	46.8	67.4	0.269	436	432	31.21	12 14.1
	28	20	37	51.75	155.23	11	14	21.8	+ 25.0	0.269	299	- 137	31.23	12 07.6
	29	20	35	16.68	155.07	11	14	37.9	- 16.1	0.269	456	+ 157	31.21	12 01.1
					153.91				55.4			453		
Feb.	30	20	32	42.77		-11	15	33.3		0.269	909		31.16	11 54.6
	31	20	30	11.07	-151.70	11	17	06.1	- 92.8	0.270	656	+ 747	31.07	11 48.2
	1	20	27	42.52	148.55	11	19	14.3	128.2	0.271	695	1039	30.95	11 41.8
	2	20	25	18.12	144.40	11	21	55.6	161.3	0.273	024	1329	30.80	11 35.5
	3	20	22	58.78	139.34	11	25	07.4	191.8	0.274	639	1615	30.62	11 29.3
					133.42				220.0			1897		
	4	20	20	45.36		-11	28	47.4		0.276	536		30.41	11 23.3
	5	20	18	38.66	-126.70	11	32	53.0	-245.6	0.278	708	+2172	30.17	11 17.3
	6	20	16	39.40	119.26	11	37	21.4	268.4	0.281	149	2441	29.91	11 11.4
	7	20	14	48.23	111.17	11	42	10.0	288.6	0.283	852	2703	29.63	11 05.7
	8	20	13	05.70	102.53	11	47	16.4	306.4	0.286	810	2958	29.32	11 00.2
					93.41				321.1			3205		
	9	20	11	32.29		-11	52	37.5		0.290	015		29.00	10 54.8
	10	20	10	08.40	- 83.89	11	58	11.2	-333.7	0.293	457	+3442	28.66	10 49.5
	11	20	08	54.33	74.07	12	03	54.8	343.6	0.297	128	3671	28.30	10 44.4
	12	20	07	50.28	64.05	12	09	45.7	350.9	0.301	019	3891	27.94	10 39.5
	13	20	06	56.45	53.83	12	15	42.2	356.5	0.305	122	4103	27.56	10 34.8
					43.54				359.2			4305		
	14	20	06	12.91		-12	21	41.4		0.309	427		27.18	10 30.2
	15	20	05	39.68	- 33.23	-12	27	41.5	-360.1	0.313	925	+4498	26.79	10 25.8

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi-diameter	Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s	s	°	'	"	"				h	m
Feb. 15	20	05	39.68	-22.92	-12	27	41.5	-359.1	0.313 925	+4685	26.79	28.03	10 25.8
16	20	05	16.76	12.71	12	33	40.6	355.9	0.318 610	4860	26.40	27.62	10 21.5
17	20	05	04.05	-2.58	12	39	36.5	350.9	0.323 470	5030	26.00	27.20	10 17.5
18	20	05	01.47	+7.37	12	45	27.4	344.0	0.328 500	5191	25.60	26.79	10 13.6
19	20	05	08.84	17.18	12	51	11.4	335.6	0.333 691	5344	25.20	26.37	10 09.8
20	20	05	26.02	+26.79	-12	56	47.0	-325.5	0.339 035	+5491	24.81	25.96	10 06.3
21	20	05	52.81	36.16	13	02	12.5	313.7	0.344 526	5630	24.41	25.54	10 02.8
22	20	06	28.97	45.32	13	07	26.2	300.6	0.350 156	5762	24.02	25.13	9 59.6
23	20	07	14.29	54.24	13	12	26.8	286.2	0.355 918	5888	23.63	24.72	9 56.4
24	20	08	08.53	62.88	13	17	13.0	270.3	0.361 806	6009	23.24	24.32	9 53.5
25	20	09	11.41	+71.28	-13	21	43.3	-253.2	0.367 815	+6123	22.86	23.93	9 50.6
26	20	10	22.69	79.40	13	25	56.5	234.8	0.373 938	6231	22.49	23.53	9 47.9
27	20	11	42.09	87.28	13	29	51.3	215.5	0.380 169	6335	22.12	23.15	9 45.4
28	20	13	09.37	94.87	13	33	26.8	195.0	0.386 504	6433	21.76	22.77	9 43.0
Mar. 1	20	14	44.24	102.21	13	36	41.8	173.6	0.392 937	6527	21.40	22.40	9 40.6
2	20	16	26.45	+109.28	-13	39	35.4	-151.1	0.399 464	+6615	21.05	22.03	9 38.5
3	20	18	15.73	116.10	13	42	06.5	127.8	0.406 079	6700	20.71	21.67	9 36.4
4	20	20	11.83	122.67	13	44	14.3	103.7	0.412 779	6779	20.37	21.32	9 34.4
5	20	22	14.50	129.00	13	45	58.0	78.7	0.419 558	6855	20.04	20.97	9 32.6
6	20	24	23.50	135.06	13	47	16.7	53.1	0.426 413	6926	19.72	20.64	9 30.8
7	20	26	38.56	+140.88	-13	48	09.8	-26.8	0.433 339	+6993	19.41	20.31	9 29.2
8	20	28	59.44	146.47	13	48	36.6	+0.1	0.440 332	7057	19.10	19.98	9 27.6
9	20	31	25.91	151.82	13	48	36.5	27.4	0.447 389	7116	18.80	19.67	9 26.2
10	20	33	57.73	156.92	13	48	09.1	55.3	0.454 505	7171	18.50	19.36	9 24.8
11	20	36	34.65	161.80	13	47	13.8	83.5	0.461 676	7224	18.22	19.06	9 23.5
12	20	39	16.45	+166.45	-13	45	50.3	+112.1	0.468 900	+7273	17.94	18.77	9 22.3
13	20	42	02.90	170.87	13	43	58.2	140.9	0.476 173	7319	17.66	18.48	9 21.1
14	20	44	53.77	175.10	13	41	37.3	170.1	0.483 492	7363	17.39	18.20	9 20.1
15	20	47	48.87	179.11	13	38	47.2	199.4	0.490 855	7403	17.13	17.93	9 19.1
16	20	50	47.98	182.92	13	35	27.8	229.0	0.498 258	7441	16.88	17.66	9 18.1
17	20	53	50.90	+186.54	-13	31	38.8	+258.5	0.505 699	+7478	16.63	17.40	9 17.3
18	20	56	57.44	189.98	13	27	20.3	288.3	0.513 177	7512	16.39	17.15	9 16.5
19	21	00	07.42	193.25	13	22	32.0	318.1	0.520 689	7544	16.15	16.90	9 15.7
20	21	03	20.67	196.34	13	17	13.9	348.0	0.528 233	7574	15.92	16.66	9 15.0
21	21	06	37.01	199.27	13	11	25.9	377.8	0.535 807	7602	15.70	16.42	9 14.3
22	21	09	56.28	+202.05	-13	05	08.1	+407.7	0.543 409	+7630	15.48	16.19	9 13.7
23	21	13	18.33	204.68	12	58	20.4	437.4	0.551 039	7654	15.26	15.97	9 13.2
24	21	16	43.01	207.19	12	51	03.0	467.2	0.558 693	7679	15.05	15.75	9 12.7
25	21	20	10.20	209.53	12	43	15.8	496.8	0.566 372	7702	14.85	15.54	9 12.2
26	21	23	39.73	211.77	12	34	59.0	526.3	0.574 074	7722	14.65	15.33	9 11.8
27	21	27	11.50	+213.89	-12	26	12.7	+555.6	0.581 796	+7744	14.46	15.13	9 11.4
28	21	30	45.39	215.88	12	16	57.1	584.9	0.589 540	7762	14.27	14.93	9 11.0
29	21	34	21.27	217.77	12	07	12.2	613.7	0.597 302	7780	14.08	14.73	9 10.7
30	21	37	59.04	219.56	11	56	58.5	642.7	0.605 082	7797	13.90	14.54	9 10.4
31	21	41	38.60	221.26	11	46	15.8	671.1	0.612 879	7813	13.72	14.36	9 10.1
Apr. 1	21	45	19.86	+222.87	-11	35	04.7	+699.4	0.620 692	+7827	13.55	14.18	9 09.8
2	21	49	02.73		-11	23	25.3		0.628 519		13.38	14.00	9 09.6

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME														Transit, Meridian of Green- wich
Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax		
	h	m	s		°	'	"	"			"	"	h	m
Apr.	1	21	45	19.86	+222.87	-11	35	04.7	+699.4	0.620 692	+7827	13.55	14.18	9 09.8
	2	21	49	02.73	224.39	11	23	25.3	727.5	0.628 519	7841	13.38	14.00	9 09.6
	3	21	52	47.12	225.83	11	11	17.8	755.2	0.636 360	7854	13.22	13.83	9 09.4
	4	21	56	32.95	227.19	10	58	42.6	782.7	0.644 214	7864	13.05	13.66	9 09.3
	5	22	00	20.14	228.48	10	45	39.9	809.8	0.652 078	7874	12.90	13.50	9 09.1
	6	22	04	08.62	+229.70	-10	32	10.1	+836.3	0.659 952	+7881	12.74	13.33	9 09.0
	7	22	07	58.32	230.84	10	18	13.8	862.8	0.667 833	7889	12.59	13.18	9 08.9
	8	22	11	49.16	231.92	10	03	51.0	888.5	0.675 722	7894	12.45	13.02	9 08.8
	9	22	15	41.08	232.92	9	49	02.5	914.1	0.683 616	7899	12.30	12.87	9 08.7
	10	22	19	34.00	233.87	9	33	48.4	938.8	0.691 515	7901	12.16	12.73	9 08.7
	11	22	23	27.87	+234.75	-9	18	09.6	+963.2	0.699 416	+7904	12.02	12.58	9 08.6
	12	22	27	22.62	235.58	9	02	06.4	987.2	0.707 320	7905	11.89	12.44	9 08.6
	13	22	31	18.20	236.35	8	45	39.2	1010.6	0.715 225	7905	11.76	12.30	9 08.6
	14	22	35	14.55	237.08	8	28	48.6	1033.4	0.723 130	7905	11.63	12.17	9 08.6
	15	22	39	11.63	237.75	8	11	35.2	1055.7	0.731 035	7903	11.50	12.04	9 08.6
	16	22	43	09.38	+238.40	-7	53	59.5	+1077.6	0.738 938	+7901	11.38	11.91	9 08.6
	17	22	47	07.78	238.99	7	36	01.9	1098.7	0.746 839	7898	11.26	11.78	9 08.7
	18	22	51	06.77	239.55	7	17	43.2	1119.4	0.754 737	7895	11.14	11.66	9 08.7
	19	22	55	06.32	240.08	6	59	03.8	1139.5	0.762 632	7892	11.03	11.54	9 08.8
	20	22	59	06.40	240.57	6	40	04.3	1159.0	0.770 524	7886	10.91	11.42	9 08.8
	21	23	03	06.97	+241.06	-6	20	45.3	+1177.9	0.778 410	+7882	10.80	11.30	9 08.9
	22	23	07	08.03	241.50	6	01	07.4	1196.3	0.786 292	7877	10.70	11.19	9 09.0
	23	23	11	09.53	241.93	5	41	11.1	1214.1	0.794 169	7871	10.59	11.08	9 09.1
	24	23	15	11.46	242.34	5	20	57.0	1231.2	0.802 040	7865	10.49	10.97	9 09.2
	25	23	19	13.80	242.74	5	00	25.8	1247.8	0.809 905	7858	10.38	10.87	9 09.3
	26	23	23	16.54	+243.13	-4	39	38.0	+1263.8	0.817 763	+7851	10.28	10.76	9 09.4
	27	23	27	19.67	243.52	4	18	34.2	1279.3	0.825 614	7845	10.19	10.66	9 09.5
	28	23	31	23.19	243.90	3	57	14.9	1294.1	0.833 459	7837	10.09	10.56	9 09.6
	29	23	35	27.09	244.28	3	35	40.8	1308.3	0.841 296	7829	10.00	10.46	9 09.7
	30	23	39	31.37	244.66	3	13	52.5	1322.0	0.849 125	7821	9.90	10.36	9 09.8
May	1	23	43	36.03	+245.03	-2	51	50.5	+1335.0	0.856 946	+7811	9.81	10.27	9 10.0
	2	23	47	41.06	245.43	2	29	35.5	1347.5	0.864 757	7802	9.73	10.18	9 10.1
	3	23	51	46.49	245.82	2	07	08.0	1359.3	0.872 559	7792	9.64	10.09	9 10.3
	4	23	55	52.31	246.22	1	44	28.7	1370.5	0.880 351	7780	9.55	10.00	9 10.4
	5	23	59	58.53	246.62	1	21	38.2	1381.0	0.888 131	7769	9.47	9.91	9 10.6
	6	0	04	05.15	+247.04	-0	58	37.2	+1391.0	0.895 900	+7755	9.39	9.82	9 10.8
	7	0	08	12.19	247.46	0	35	26.2	1400.3	0.903 655	7742	9.31	9.74	9 10.9
	8	0	12	19.65	247.88	-0	12	05.9	1408.8	0.911 397	7726	9.23	9.66	9 11.1
	9	0	16	27.53	248.31	+0	11	22.9	1416.8	0.919 123	7712	9.15	9.57	9 11.3
	10	0	20	35.84	248.76	0	34	59.7	1424.1	0.926 835	7695	9.07	9.49	9 11.5
	11	0	24	44.60	+249.20	+0	58	43.8	+1430.7	0.934 530	+7678	9.00	9.42	9 11.7
	12	0	28	53.80	249.67	1	22	34.5	1436.6	0.942 208	7661	8.93	9.34	9 11.9
	13	0	33	03.47	250.13	1	46	31.1	1441.9	0.949 869	7643	8.85	9.26	9 12.2
	14	0	37	13.60	250.62	2	10	33.0	1446.4	0.957 512	7624	8.78	9.19	9 12.4
	15	0	41	24.22	251.12	2	34	39.4	1450.3	0.965 136	7606	8.71	9.12	9 12.6
	16	0	45	35.34	+251.62	+2	58	49.7	+1453.7	0.972 742	+7585	8.65	9.05	9 12.9
	17	0	49	46.96		+3	23	03.4		0.980 327		8.58	8.98	9 13.1

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"		"	"	h m
May 17	0	49	46.96	+252.15	+	3	23	03.4	0.980 327	+7566	8.58	9 13.1
18	0	53	59.11	252.69		3	47	19.5	0.987 893	7545	8.51	9 13.4
19	0	58	11.80	253.25		4	11	37.5	0.995 438	7525	8.45	9 13.7
20	1	02	25.05	253.81		4	35	56.7	1.002 963	7503	8.39	9 14.0
21	1	06	38.86	254.41		5	00	16.4	1.010 466	7482	8.32	9 14.2
22	1	10	53.27	+255.02	+	5	24	36.1	1.017 948	+7461	8.26	9 14.5
23	1	15	08.29	255.64		5	48	54.8	1.025 409	7439	8.20	9 14.9
24	1	19	23.93	256.30		6	13	12.1	1.032 848	7417	8.14	9 15.2
25	1	23	40.23	256.97		6	37	27.2	1.040 265	7396	8.08	9 15.5
26	1	27	57.20	257.66		7	01	39.5	1.047 661	7373	8.03	9 15.9
27	1	32	14.86	+258.38	+	7	25	48.3	1.055 034	+7350	7.97	9 16.2
28	1	36	33.24	259.14		7	49	53.0	1.062 384	7328	7.92	9 16.6
29	1	40	52.38	259.90		8	13	52.8	1.069 712	7305	7.86	9 17.0
30	1	45	12.28	260.70		8	37	47.1	1.077 017	7282	7.81	9 17.4
31	1	49	32.98	261.53		9	01	35.3	1.084 299	7258	7.76	9 17.8
June 1	1	53	54.51	+262.37	+	9	25	16.6	1.091 557	+7233	7.70	9 18.2
2	1	58	16.88	263.26		9	48	50.4	1.098 790	7208	7.65	9 18.6
3	2	02	40.14	264.14		10	12	16.1	1.105 998	7182	7.60	9 19.1
4	2	07	04.28	265.07		10	35	32.8	1.113 180	7155	7.55	9 19.5
5	2	11	29.35	266.01		10	58	40.0	1.120 335	7129	7.51	9 20.0
6	2	15	55.36	+266.97	+11	21	36.9	+1365.9	1.127 464	+7100	7.46	9 20.5
7	2	20	22.33	267.95		11	44	22.8	1.134 564	7071	7.41	9 21.0
8	2	24	50.28	268.93		12	06	57.1	1.141 635	7042	7.37	9 21.6
9	2	29	19.21	269.96		12	29	19.0	1.148 677	7012	7.32	9 22.1
10	2	33	49.17	270.98		12	51	27.7	1.155 689	6981	7.28	9 22.7
11	2	38	20.15	+272.02	+13	13	22.7	+1300.4	1.162 670	+6950	7.23	9 23.3
12	2	42	52.17	273.07		13	35	03.1	1.169 620	6918	7.19	9 23.8
13	2	47	25.24	274.15		13	56	28.3	1.176 538	6886	7.15	9 24.5
14	2	51	59.39	275.22		14	17	37.6	1.183 424	6854	7.11	9 25.1
15	2	56	34.61	276.31		14	38	30.2	1.190 278	6820	7.07	9 25.8
16	3	01	10.92	+277.41	+14	59	05.4	+1217.3	1.197 098	+6787	7.03	9 26.4
17	3	05	48.33	278.51		15	19	22.7	1.203 885	6753	6.99	9 27.1
18	3	10	26.84	279.62		15	39	21.1	1.210 638	6719	6.95	9 27.8
19	3	15	06.46	280.74		15	59	00.1	1.217 357	6685	6.91	9 28.5
20	3	19	47.20	281.87		16	18	18.9	1.224 042	6651	6.87	9 29.3
21	3	24	29.07	+282.99	+16	37	16.8	+1116.5	1.230 693	+6616	6.83	9 30.0
22	3	29	12.06	284.12		16	55	53.3	1.237 309	6581	6.80	9 30.8
23	3	33	56.18	285.25		17	14	07.5	1.243 890	6547	6.76	9 31.6
24	3	38	41.43	286.39		17	31	58.8	1.250 437	6513	6.73	9 32.5
25	3	43	27.82	287.53		17	49	26.5	1.256 950	6477	6.69	9 33.3
26	3	48	15.35	+288.66	+18	06	30.0	+ 998.6	1.263 427	+6443	6.66	9 34.1
27	3	53	04.01	289.80		18	23	08.6	1.269 870	6407	6.62	9 35.0
28	3	57	53.81	290.93		18	39	21.7	1.276 277	6371	6.59	9 35.9
29	4	02	44.74	292.06		18	55	08.6	1.282 648	6336	6.56	9 36.8
30	4	07	36.80	293.19		19	10	28.7	1.288 984	6299	6.52	9 37.8
July 1	4	12	29.99	+294.30	+19	25	21.2	+ 864.5	1.295 283	+6263	6.49	9 38.7
2	4	17	24.29		+19	39	45.7		1.301 546		6.46	9 39.7

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME												Transit, Meridian of Green- wich			
Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax		
		h	m	s	s	°	'	"	"			"	"	h	m
July	1	4	12	29.99	+294.30	+19	25	21.2	+864.5	1.295 283	+6263	6.49	6.79	9	38.7
	2	4	17	24.29	295.40	19	39	45.7	835.8	1.301 546	6225	6.46	6.76	9	39.7
	3	4	22	19.69	296.50	19	53	41.5	806.5	1.307 771	6187	6.43	6.73	9	40.7
	4	4	27	16.19	297.56	20	07	08.0	776.6	1.313 958	6149	6.40	6.70	9	41.7
	5	4	32	13.75	298.62	20	20	04.6	746.0	1.320 107	6109	6.37	6.67	9	42.7
	6	4	37	12.37	+299.66	+20	32	30.6	+715.0	1.326 216	+6069	6.34	6.64	9	43.8
	7	4	42	12.03	300.66	20	44	25.6	683.4	1.332 285	6029	6.31	6.61	9	44.8
	8	4	47	12.69	301.65	20	55	49.0	651.2	1.338 314	5987	6.28	6.58	9	45.9
	9	4	52	14.34	302.59	21	06	40.2	618.5	1.344 301	5946	6.26	6.55	9	47.0
	10	4	57	16.93	303.53	21	16	58.7	585.2	1.350 247	5904	6.23	6.52	9	48.1
	11	5	02	20.46	+304.41	+21	26	43.9	+551.5	1.356 151	+5862	6.20	6.49	9	49.2
	12	5	07	24.87	305.27	21	35	55.4	517.4	1.362 013	5818	6.17	6.46	9	50.3
	13	5	12	30.14	306.09	21	44	32.8	482.7	1.367 831	5775	6.15	6.43	9	51.5
	14	5	17	36.23	306.86	21	52	35.5	447.6	1.373 606	5731	6.12	6.41	9	52.7
	15	5	22	43.09	307.61	22	00	03.1	412.1	1.379 337	5687	6.10	6.38	9	53.8
	16	5	27	50.70	+308.30	+22	06	55.2	+376.2	1.385 024	+5643	6.07	6.35	9	55.0
17	5	32	59.00	308.96	22	13	11.4	340.0	1.390 667	5597	6.05	6.33	9	56.2	
18	5	38	07.96	309.55	22	18	51.4	303.3	1.396 264	5554	6.02	6.30	9	57.4	
19	5	43	17.51	310.13	22	23	54.7	266.4	1.401 818	5508	6.00	6.28	9	58.7	
20	5	48	27.64	310.63	22	28	21.1	229.2	1.407 326	5463	5.98	6.25	9	59.9	
21	5	53	38.27	+311.10	+22	32	10.3	+191.7	1.412 789	+5419	5.95	6.23	10	01.1	
22	5	58	49.37	311.53	22	35	22.0	153.9	1.418 208	5374	5.93	6.20	10	02.4	
23	6	04	00.90	311.89	22	37	55.9	115.9	1.423 582	5329	5.91	6.18	10	03.6	
24	6	09	12.79	312.23	22	39	51.8	77.7	1.428 911	5284	5.89	6.16	10	04.9	
25	6	14	25.02	312.50	22	41	09.5	39.4	1.434 195	5240	5.86	6.14	10	06.2	
26	6	19	37.52	+312.74	+22	41	48.9	+ 0.8	1.439 435	+5196	5.84	6.11	10	07.4	
27	6	24	50.26	312.92	22	41	49.7	- 37.8	1.444 631	5150	5.82	6.09	10	08.7	
28	6	30	03.18	313.06	22	41	11.9	76.5	1.449 781	5105	5.80	6.07	10	10.0	
29	6	35	16.24	313.15	22	39	55.4	115.4	1.454 886	5059	5.78	6.05	10	11.3	
30	6	40	29.39	313.19	22	38	00.0	154.2	1.459 945	5014	5.76	6.03	10	12.5	
Aug.	31	6	45	42.58	+313.18	+22	35	25.8	-193.1	1.464 959	+4968	5.74	6.01	10	13.8
	1	6	50	55.76	313.14	22	32	12.7	231.9	1.469 927	4921	5.72	5.99	10	15.1
	2	6	56	08.90	313.02	22	28	20.8	270.7	1.474 848	4874	5.70	5.97	10	16.4
	3	7	01	21.92	312.88	22	23	50.1	309.4	1.479 722	4827	5.68	5.95	10	17.6
	4	7	06	34.80	312.68	22	18	40.7	348.1	1.484 549	4779	5.66	5.93	10	18.9
	5	7	11	47.48	+312.43	+22	12	52.6	-386.6	1.489 328	+4731	5.65	5.91	10	20.2
	6	7	16	59.91	312.14	22	06	26.0	425.0	1.494 059	4682	5.63	5.89	10	21.4
	7	7	22	12.05	311.80	21	59	21.0	463.1	1.498 741	4633	5.61	5.87	10	22.7
	8	7	27	23.85	311.42	21	51	37.9	501.1	1.503 374	4583	5.59	5.85	10	24.0
	9	7	32	35.27	310.99	21	43	16.8	538.8	1.507 957	4534	5.58	5.84	10	25.2
	10	7	37	46.26	+310.51	+21	34	18.0	-576.4	1.512 491	+4483	5.56	5.82	10	26.4
	11	7	42	56.77	310.01	21	24	41.6	613.5	1.516 974	4433	5.54	5.80	10	27.7
	12	7	48	06.78	309.45	21	14	28.1	650.3	1.521 407	4382	5.53	5.78	10	28.9
	13	7	53	16.23	308.85	21	03	37.8	686.9	1.525 789	4331	5.51	5.77	10	30.1
	14	7	58	25.08	308.23	20	52	10.9	723.1	1.530 120	4279	5.50	5.75	10	31.3
	15	8	03	33.31	+307.55	+20	40	07.8	-758.9	1.534 399	+4228	5.48	5.74	10	32.5
16	8	08	40.86		+20	27	28.9		1.538 627		5.47	5.72	10	33.7	

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"			"	"	h m
Aug. 16	8	08	40.86	+306.85	+20	27	28.9	-794.2	1.538 627	+4177	5.47	5.72	10 33.7
17	8	13	47.71	306.12	20	14	14.7	829.3	1.542 804	4125	5.45	5.70	10 34.8
18	8	18	53.83	305.36	20	00	25.4	863.7	1.546 929	4074	5.44	5.69	10 36.0
19	8	23	59.19	304.57	19	46	01.7	897.9	1.551 003	4023	5.42	5.67	10 37.1
20	8	29	03.76	303.75	19	31	03.8	931.4	1.555 026	3972	5.41	5.66	10 38.3
21	8	34	07.51	+302.92	+19	15	32.4	-964.5	1.558 998	+3922	5.39	5.64	10 39.4
22	8	39	10.43	302.07	18	59	27.9	997.2	1.562 920	3872	5.38	5.63	10 40.5
23	8	44	12.50	301.21	18	42	50.7	1029.2	1.566 792	3821	5.37	5.62	10 41.6
24	8	49	13.71	300.32	18	25	41.5	1060.8	1.570 613	3771	5.35	5.60	10 42.6
25	8	54	14.03	299.43	18	08	00.7	1091.9	1.574 384	3722	5.34	5.59	10 43.7
26	8	59	13.46	+298.54	+17	49	48.8	-1122.3	1.578 106	+3671	5.33	5.58	10 44.7
27	9	04	12.00	297.64	17	31	06.5	1152.2	1.581 777	3621	5.32	5.56	10 45.8
28	9	09	09.64	296.73	17	11	54.3	1181.5	1.585 398	3571	5.30	5.55	10 46.8
29	9	14	06.37	295.82	16	52	12.8	1210.3	1.588 969	3521	5.29	5.54	10 47.8
30	9	19	02.19	294.91	16	32	02.5	1238.4	1.592 490	3470	5.28	5.53	10 48.8
31	9	23	57.10	+294.01	+16	11	24.1	-1265.9	1.595 960	+3420	5.27	5.51	10 49.7
Sept. 1	9	28	51.11	293.10	15	50	18.2	1292.8	1.599 380	3369	5.26	5.50	10 50.7
2	9	33	44.21	292.20	15	28	45.4	1319.0	1.602 749	3318	5.25	5.49	10 51.6
3	9	38	36.41	291.31	15	06	46.4	1344.6	1.606 067	3267	5.24	5.48	10 52.5
4	9	43	27.72	290.42	14	44	21.8	1369.6	1.609 334	3215	5.23	5.47	10 53.4
5	9	48	18.14	+289.55	+14	21	32.2	-1393.9	1.612 549	+3164	5.22	5.46	10 54.3
6	9	53	07.69	288.69	13	58	18.3	1417.4	1.615 713	3112	5.21	5.45	10 55.2
7	9	57	56.38	287.84	13	34	40.9	1440.4	1.618 825	3059	5.20	5.44	10 56.1
8	10	02	44.22	287.00	13	10	40.5	1462.7	1.621 884	3007	5.19	5.43	10 56.9
9	10	07	31.22	286.18	12	46	17.8	1484.3	1.624 891	2955	5.18	5.42	10 57.8
10	10	12	17.40	+285.37	+12	21	33.5	-1505.0	1.627 846	+2902	5.17	5.41	10 58.6
11	10	17	02.77	284.59	11	56	28.5	1525.3	1.630 748	2848	5.16	5.40	10 59.4
12	10	21	47.36	283.82	11	31	03.2	1544.7	1.633 596	2796	5.15	5.39	11 00.2
13	10	26	31.18	283.07	11	05	18.5	1563.5	1.636 392	2743	5.14	5.38	11 01.0
14	10	31	14.25	282.33	10	39	15.0	1581.5	1.639 135	2690	5.13	5.37	11 01.7
15	10	35	56.58	+281.63	+10	12	53.5	-1598.8	1.641 825	+2637	5.12	5.36	11 02.5
16	10	40	38.21	280.95	9	46	14.7	1615.4	1.644 462	2584	5.11	5.35	11 03.2
17	10	45	19.16	280.30	9	19	19.3	1631.3	1.647 046	2533	5.11	5.34	11 04.0
18	10	49	59.46	279.66	8	52	08.0	1646.4	1.649 579	2481	5.10	5.33	11 04.7
19	10	54	39.12	279.06	8	24	41.6	1660.9	1.652 060	2430	5.09	5.33	11 05.4
20	10	59	18.18	+278.49	+7	57	00.7	-1674.7	1.654 490	+2379	5.08	5.32	11 06.1
21	11	03	56.67	277.96	7	29	06.0	1687.7	1.656 869	2328	5.08	5.31	11 06.8
22	11	08	34.63	277.45	7	00	58.3	1700.0	1.659 197	2279	5.07	5.30	11 07.5
23	11	13	12.08	276.99	6	32	38.3	1711.7	1.661 476	2228	5.06	5.30	11 08.2
24	11	17	49.07	276.56	6	04	06.6	1722.5	1.663 704	2179	5.05	5.29	11 08.8
25	11	22	25.63	+276.15	+5	35	24.1	-1732.8	1.665 883	+2129	5.05	5.28	11 09.5
26	11	27	01.78	275.81	5	06	31.3	1742.2	1.668 012	2080	5.04	5.28	11 10.2
27	11	31	37.59	275.48	4	37	29.1	1751.0	1.670 092	2030	5.04	5.27	11 10.8
28	11	36	13.07	275.20	4	08	18.1	1759.1	1.672 122	1982	5.03	5.26	11 11.5
29	11	40	48.27	274.96	3	38	59.0	1766.4	1.674 104	1932	5.02	5.26	11 12.1
30	11	45	23.23	+274.76	+3	09	32.6	-1772.9	1.676 036	+1883	5.02	5.25	11 12.7
Oct. 1	11	49	57.99		+2	39	59.7		1.677 919		5.01	5.24	11 13.4

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Semi- diam- eter	Hor. Paral- ax	Transit, Meridian of Green- wich
		h m s	° ' " "		"	"	h m
Oct.	1	11 49 57.99 ^s +274.59	+ 2 39 59.7 -1778.9	1.677 919 +1834	5.01	5.24	11 13.4
	2	11 54 32.58 274.47	2 10 20.8 1784.0	1.679 753 1785	5.01	5.24	11 14.0
	3	11 59 07.05 274.39	1 40 36.8 1788.4	1.681 538 1735	5.00	5.23	11 14.6
	4	12 03 41.44 274.34	1 10 48.4 1792.1	1.683 273 1686	5.00	5.23	11 15.3
	5	12 08 15.78 274.34	0 40 56.3 1795.1	1.684 959 1637	4.99	5.22	11 15.9
	6	12 12 50.12 +274.38	+ 0 11 01.2 -1797.3	1.686 596 +1587	4.99	5.22	11 16.5
	7	12 17 24.50 274.46	- 0 18 56.1 1798.8	1.688 183 1538	4.98	5.21	11 17.2
	8	12 21 58.96 274.58	0 48 54.9 1799.4	1.689 721 1488	4.98	5.21	11 17.8
	9	12 26 33.54 274.74	1 18 54.3 1799.5	1.691 209 1438	4.97	5.20	11 18.4
	10	12 31 08.28 274.93	1 48 53.8 1798.7	1.692 647 1388	4.97	5.20	11 19.1
	11	12 35 43.21 +275.17	- 2 18 52.5 -1797.1	1.694 035 +1338	4.96	5.19	11 19.7
	12	12 40 18.38 275.44	2 48 49.6 1794.8	1.695 373 1289	4.96	5.19	11 20.4
	13	12 44 53.82 275.75	3 18 44.4 1791.8	1.696 662 1238	4.96	5.19	11 21.0
	14	12 49 29.57 276.10	3 48 36.2 1787.9	1.697 900 1189	4.95	5.18	11 21.7
	15	12 54 05.67 276.48	4 18 24.1 1783.3	1.699 089 1140	4.95	5.18	11 22.3
	16	12 58 42.15 +276.91	- 4 48 07.4 -1777.9	1.700 229 +1091	4.95	5.18	11 23.0
	17	13 03 19.06 277.37	5 17 45.3 1771.8	1.701 320 1043	4.94	5.17	11 23.7
	18	13 07 56.43 277.87	5 47 17.1 1764.9	1.702 363 996	4.94	5.17	11 24.4
	19	13 12 34.30 278.42	6 16 42.0 1757.2	1.703 359 948	4.94	5.17	11 25.1
	20	13 17 12.72 278.99	6 45 59.2 1748.7	1.704 307 901	4.93	5.16	11 25.8
	21	13 21 51.71 +279.61	- 7 15 07.9 -1739.6	1.705 208 + 855	4.93	5.16	11 26.5
	22	13 26 31.32 280.27	7 44 07.5 1729.6	1.706 063 810	4.93	5.16	11 27.2
	23	13 31 11.59 280.96	8 12 57.1 1718.8	1.706 873 763	4.93	5.16	11 27.9
	24	13 35 52.55 281.70	8 41 35.9 1707.3	1.707 636 719	4.92	5.15	11 28.7
	25	13 40 34.25 282.47	9 10 03.2 1695.0	1.708 355 673	4.92	5.15	11 29.4
	26	13 45 16.72 +283.28	- 9 38 18.2 -1681.9	1.709 028 + 629	4.92	5.15	11 30.2
	27	13 50 00.00 284.12	10 06 20.1 1668.0	1.709 657 584	4.92	5.15	11 31.0
	28	13 54 44.12 285.00	10 34 08.1 1653.4	1.710 241 540	4.92	5.15	11 31.8
	29	13 59 29.12 285.91	11 01 41.5 1637.9	1.710 781 495	4.92	5.14	11 32.6
	30	14 04 15.03 286.86	11 28 59.4 1621.7	1.711 276 452	4.91	5.14	11 33.4
Nov.	31	14 09 01.89 +287.83	-11 56 01.1 -1604.6	1.711 728 + 407	4.91	5.14	11 34.3
	1	14 13 49.72 288.85	12 22 45.7 1586.8	1.712 135 364	4.91	5.14	11 35.1
	2	14 18 38.57 289.88	12 49 12.5 1568.1	1.712 499 319	4.91	5.14	11 36.0
	3	14 23 28.45 290.93	13 15 20.6 1548.8	1.712 818 275	4.91	5.14	11 36.9
	4	14 28 19.38 292.03	13 41 09.4 1528.4	1.713 093 232	4.91	5.14	11 37.8
	5	14 33 11.41 +293.15	-14 06 37.8 -1507.4	1.713 325 + 187	4.91	5.14	11 38.8
	6	14 38 04.56 294.27	14 31 45.2 1485.5	1.713 512 143	4.91	5.14	11 39.7
	7	14 42 58.83 295.43	14 56 30.7 1462.9	1.713 655 99	4.91	5.14	11 40.7
	8	14 47 54.26 296.59	15 20 53.6 1439.4	1.713 754 54	4.91	5.13	11 41.7
	9	14 52 50.85 297.78	15 44 53.0 1415.1	1.713 808 + 10	4.91	5.13	11 42.7
	10	14 57 48.63 +298.97	-16 08 28.1 -1389.9	1.713 818 - 35	4.91	5.13	11 43.7
	11	15 02 47.60 300.18	16 31 38.0 1364.1	1.713 783 79	4.91	5.13	11 44.8
	12	15 07 47.78 301.38	16 54 22.1 1337.3	1.713 704 124	4.91	5.14	11 45.9
	13	15 12 49.16 302.60	17 16 39.4 1309.8	1.713 580 167	4.91	5.14	11 46.9
	14	15 17 51.76 303.82	17 38 29.2 1281.6	1.713 413 212	4.91	5.14	11 48.1
	15	15 22 55.58 +305.03	-17 59 50.8 -1252.4	1.713 201 - 254	4.91	5.14	11 49.2
	16	15 28 00.61	-18 20 43.2	1.712 947	4.91	5.14	11 50.3

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"				
Nov. 16	15	28	00.61	+306.26	-18	20	43.2	-1222.6	1.712 947	4.91	5.14	11 50.3
17	15	33	06.87	307.47	18	41	05.8	1191.9	1.712 651	4.91	5.14	11 51.5
18	15	38	14.34	308.68	19	00	57.7	1160.6	1.712 312	4.91	5.14	11 52.7
19	15	43	23.02	309.89	19	20	18.3	1128.4	1.711 931	4.91	5.14	11 53.9
20	15	48	32.91	311.08	19	39	06.7	1095.6	1.711 509	4.91	5.14	11 55.2
21	15	53	43.99	+312.27	-19	57	22.3	-1062.0	1.711 047	4.92	5.14	11 56.4
22	15	58	56.26	313.44	20	15	04.3	1027.7	1.710 543	4.92	5.14	11 57.7
23	16	04	09.70	314.59	20	32	12.0	992.6	1.709 999	4.92	5.15	11 59.0
24	16	09	24.29	315.73	20	48	44.6	957.0	1.709 416	4.92	5.15	12 00.3
25	16	14	40.02	316.84	21	04	41.6	920.6	1.708 793	4.92	5.15	12 01.6
26	16	19	56.86	+317.93	-21	20	02.2	-883.7	1.708 130	4.92	5.15	12 03.0
27	16	25	14.79	319.00	21	34	45.9	846.0	1.707 428	4.93	5.15	12 04.3
28	16	30	33.79	320.02	21	48	51.9	807.7	1.706 687	4.93	5.16	12 05.7
29	16	35	53.81	321.03	22	02	19.6	768.9	1.705 907	4.93	5.16	12 07.1
30	16	41	14.84	322.00	22	15	08.5	729.5	1.705 088	4.93	5.16	12 08.5
Dec. 1	16	46	36.84	+322.92	-22	27	18.0	-689.5	1.704 231	4.93	5.16	12 10.0
2	16	51	59.76	323.81	22	38	47.5	649.0	1.703 335	4.94	5.17	12 11.4
3	16	57	23.57	324.66	22	49	36.5	608.1	1.702 400	4.94	5.17	12 12.9
4	17	02	48.23	325.45	22	59	44.6	566.5	1.701 426	4.94	5.17	12 14.4
5	17	08	13.68	326.20	23	09	11.1	524.7	1.700 413	4.95	5.18	12 15.8
6	17	13	39.88	+326.89	-23	17	55.8	-482.3	1.699 360	4.95	5.18	12 17.3
7	17	19	06.77	327.54	23	25	58.1	439.5	1.698 268	4.95	5.18	12 18.9
8	17	24	34.31	328.13	23	33	17.6	396.5	1.697 136	4.96	5.19	12 20.4
9	17	30	02.44	328.64	23	39	54.1	353.1	1.695 965	4.96	5.19	12 21.9
10	17	35	31.08	329.11	23	45	47.2	309.3	1.694 753	4.96	5.19	12 23.5
11	17	41	00.19	+329.50	-23	50	56.5	-265.4	1.693 502	4.97	5.20	12 25.0
12	17	46	29.69	329.84	23	55	21.9	221.2	1.692 210	4.97	5.20	12 26.6
13	17	51	59.53	330.11	23	59	03.1	176.7	1.690 879	4.97	5.20	12 28.1
14	17	57	29.64	330.31	24	01	59.8	132.2	1.689 508	4.98	5.21	12 29.7
15	18	02	59.95	330.43	24	04	12.0	87.5	1.688 097	4.98	5.21	12 31.2
16	18	08	30.38	+330.51	-24	05	39.5	-42.7	1.686 648	4.99	5.22	12 32.8
17	18	14	00.89	330.51	24	06	22.2	+ 2.1	1.685 160	4.99	5.22	12 34.4
18	18	19	31.40	330.44	24	06	20.1	46.9	1.683 633	5.00	5.23	12 35.9
19	18	25	01.84	330.31	24	05	33.2	91.8	1.682 068	5.00	5.23	12 37.5
20	18	30	32.15	330.11	24	04	01.4	136.6	1.680 465	5.00	5.24	12 39.1
21	18	36	02.26	+329.86	-24	01	44.8	+ 181.4	1.678 825	5.01	5.24	12 40.6
22	18	41	32.12	329.52	23	58	43.4	225.9	1.677 147	5.01	5.25	12 42.2
23	18	47	01.64	329.14	23	54	57.5	270.3	1.675 433	5.02	5.25	12 43.7
24	18	52	30.78	328.69	23	50	27.2	314.6	1.673 682	5.02	5.26	12 45.3
25	18	57	59.47	328.18	23	45	12.6	358.6	1.671 894	5.03	5.26	12 46.8
26	19	03	27.65	+327.61	-23	39	14.0	+ 402.4	1.670 069	5.04	5.27	12 48.3
27	19	08	55.26	327.00	23	32	31.6	445.8	1.668 208	5.04	5.28	12 49.8
28	19	14	22.26	326.31	23	25	05.8	489.1	1.666 311	5.05	5.28	12 51.3
29	19	19	48.57	325.58	23	16	56.7	532.0	1.664 378	5.05	5.29	12 52.8
30	19	25	14.15	324.80	23	08	04.7	574.3	1.662 408	5.06	5.29	12 54.3
31	19	30	38.95	+323.97	-22	58	30.4	+ 616.3	1.660 402	5.07	5.30	12 55.8
32	19	36	02.92		-22	48	14.1		1.658 360	5.07	5.31	12 57.2

FOR 0^h UNIVERSAL TIME

Date	Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
	° ' "	° ' "	' "	° ' "	' "		
Jan. - 1	80 05 57.2	1 36 47.5	+0 23.9	+0 13 29.8	+5 43.7	9.857 4662	-643
1	83 19 35.8	1 36 51.1	0 44.0	0 24 55.7	5 42.0	9.857 3406	613
3	86 33 21.5	1 36 54.6	1 03.5	0 36 17.3	5 39.3	9.857 2212	581
5	89 47 14.2	1 36 58.1	1 22.1	0 47 32.3	5 35.5	9.857 1085	546
7	93 01 13.9	1 37 01.5	1 39.8	0 58 38.5	5 30.6	9.857 0028	510
9	96 15 20.3	1 37 04.9	+1 56.2	+1 09 33.9	+5 24.6	9.856 9045	-472
11	99 29 33.2	1 37 08.1	2 11.2	1 20 16.2	5 17.6	9.856 8139	433
13	102 43 52.5	1 37 11.2	2 24.4	1 30 43.4	5 09.5	9.856 7313	393
15	105 58 17.9	1 37 14.1	2 35.8	1 40 53.5	5 00.4	9.856 6570	350
17	109 12 49.0	1 37 16.9	2 45.2	1 50 44.4	4 50.3	9.856 5912	307
19	112 27 25.5	1 37 19.6	+2 52.5	+2 00 14.1	+4 39.3	9.856 5341	-263
21	115 42 07.0	1 37 22.0	2 57.7	2 09 20.9	4 27.4	9.856 4860	218
23	118 56 53.2	1 37 24.2	3 00.5	2 18 03.0	4 14.5	9.856 4470	172
25	122 11 43.6	1 37 26.1	3 01.0	2 26 18.6	4 00.9	9.856 4172	126
27	125 26 37.6	1 37 27.9	2 59.2	2 34 06.0	3 46.4	9.856 3967	79
29	128 41 34.8	1 37 29.3	+2 55.1	+2 41 23.8	+3 31.2	9.856 3856	- 32
31	131 56 34.6	1 37 30.4	2 48.7	2 48 10.6	3 15.4	9.856 3840	+ 15
Feb. 2	135 11 36.4	1 37 31.3	2 40.2	2 54 24.9	2 58.8	9.856 3918	62
4	138 26 39.6	1 37 31.8	2 29.5	3 00 05.6	2 41.7	9.856 4090	109
6	141 41 43.5	1 37 32.0	2 17.0	3 05 11.5	2 24.1	9.856 4355	156
8	144 56 47.5	1 37 31.9	+2 02.7	+3 09 41.6	+2 06.0	9.856 4713	+202
10	148 11 50.9	1 37 31.4	1 46.9	3 13 35.2	1 47.5	9.856 5163	247
12	151 26 53.0	1 37 30.6	1 29.6	3 16 51.4	1 28.7	9.856 5703	292
14	154 41 53.1	1 37 29.4	1 11.3	3 19 29.7	1 09.6	9.856 6330	336
16	157 56 50.5	1 37 27.9	0 52.0	3 21 29.5	0 50.2	9.856 7044	378
18	161 11 44.5	1 37 26.0	+0 32.1	+3 22 50.5	+0 30.7	9.856 7842	+419
20	164 26 34.3	1 37 23.8	+0 11.7	3 23 32.5	+0 11.2	9.856 8720	459
22	167 41 19.4	1 37 21.2	-0 08.7	3 23 35.3	-0 08.4	9.856 9677	497
24	170 55 59.1	1 37 18.3	0 29.1	3 22 59.1	0 27.9	9.857 0708	534
26	174 10 32.6	1 37 15.1	0 49.1	3 21 44.0	0 47.2	9.857 1811	569
28	177 24 59.3	1 37 11.6	-1 08.4	+3 19 50.2	-1 06.5	9.857 2982	+602
Mar. 2	180 39 18.7	1 37 07.8	1 26.9	3 17 18.4	1 25.4	9.857 4217	633
4	183 53 30.3	1 37 03.7	1 44.2	3 14 08.9	1 44.0	9.857 5513	662
6	187 07 33.4	1 36 59.4	2 00.2	3 10 22.4	2 02.3	9.857 6864	689
8	190 21 27.5	1 36 54.8	2 14.7	3 05 59.9	2 20.2	9.857 8266	713
10	193 35 12.4	1 36 50.0	-2 27.4	+3 01 02.1	-2 37.5	9.857 9715	+736
12	196 48 47.5	1 36 45.0	2 38.3	2 55 30.2	2 54.3	9.858 1207	756
14	200 02 12.5	1 36 39.9	2 47.2	2 49 25.2	3 10.6	9.858 2736	773
16	203 15 27.1	1 36 34.7	2 53.9	2 42 48.4	3 26.1	9.858 4298	788
18	206 28 31.1	1 36 29.3	2 58.5	2 35 41.1	3 41.0	9.858 5887	801
20	209 41 24.3	1 36 23.9	-3 00.8	+2 28 04.7	-3 55.2	9.858 7499	+811
22	212 54 06.7	1 36 18.4	3 00.8	2 20 00.8	4 08.6	9.858 9128	818
24	216 06 38.0	1 36 12.9	2 58.6	2 11 30.9	4 21.2	9.859 0769	823
26	219 18 58.4	1 36 07.4	2 54.1	2 02 36.7	4 32.9	9.859 2417	825
28	222 31 07.8	1 36 02.0	2 47.4	1 53 20.0	4 43.7	9.859 4067	825
30	225 43 06.4	1 35 56.6	-2 38.7	+1 43 42.5	-4 53.6	9.859 5714	+822
Apr. 1	228 54 54.3	1 35 51.3	-2 28.0	+1 33 46.0	-5 02.6	9.859 7352	+816

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	° ' "	' "	° ' "	' "		
Apr.	1	228 54 54.3	1 35 51.3	-2 28.0	+1 33 46.0	-5 02.6	9.859 7352	+816
	3	232 06 31.7	1 35 46.1	2 15.5	1 23 32.6	5 10.7	9.859 8977	808
	5	235 17 58.9	1 35 41.1	2 01.3	1 13 04.0	5 17.7	9.860 0583	797
	7	238 29 16.1	1 35 36.2	1 45.6	1 02 22.3	5 23.8	9.860 2165	784
	9	241 40 23.8	1 35 31.5	1 28.6	0 51 29.6	5 28.8	9.860 3718	769
	11	244 51 22.2	1 35 27.0	-1 10.5	+0 40 27.7	-5 32.9	9.860 5239	+751
	13	248 02 11.8	1 35 22.7	0 51.5	0 29 18.8	5 35.8	9.860 6721	731
	15	251 12 53.1	1 35 18.6	0 32.0	0 18 05.0	5 37.8	9.860 8161	709
	17	254 23 26.5	1 35 14.8	-0 12.1	+0 06 48.3	5 38.7	9.860 9555	684
	19	257 33 52.6	1 35 11.3	+0 08.0	-0 04 29.3	5 38.6	9.861 0897	658
	21	260 44 11.8	1 35 08.0	+0 27.9	-0 15 45.6	-5 37.5	9.861 2185	+629
	23	263 54 24.8	1 35 05.0	0 47.5	0 26 58.6	5 35.4	9.861 3413	599
	25	267 04 32.1	1 35 02.3	1 06.5	0 38 06.3	5 32.2	9.861 4579	567
	27	270 14 34.2	1 34 59.9	1 24.7	0 49 06.7	5 28.0	9.861 5679	533
	29	273 24 31.8	1 34 57.7	1 41.9	0 59 57.8	5 22.9	9.861 6709	497
May	1	276 34 25.4	1 34 55.9	+1 57.8	-1 10 37.6	-5 16.7	9.861 7666	+460
	3	279 44 15.5	1 34 54.3	2 12.2	1 21 04.2	5 09.7	9.861 8548	422
	5	282 54 02.9	1 34 53.1	2 25.1	1 31 15.7	5 01.7	9.861 9351	382
	7	286 03 48.1	1 34 52.1	2 36.1	1 41 10.4	4 52.8	9.862 0075	341
	9	289 13 31.5	1 34 51.4	2 45.3	1 50 46.4	4 43.0	9.862 0715	299
	11	292 23 13.9	1 34 51.0	+2 52.4	-2 00 02.0	-4 32.4	9.862 1272	+257
	13	295 32 55.6	1 34 50.8	2 57.4	2 08 55.6	4 21.0	9.862 1742	213
	15	298 42 37.3	1 34 50.9	3 00.3	2 17 25.5	4 08.8	9.862 2124	169
	17	301 52 19.4	1 34 51.2	3 01.0	2 25 30.4	3 55.9	9.862 2418	125
	19	305 02 02.4	1 34 51.8	2 59.5	2 33 08.6	3 42.2	9.862 2623	80
	21	308 11 46.7	1 34 52.6	+2 55.8	-2 40 18.8	-3 27.9	9.862 2737	+ 34
	23	311 21 32.8	1 34 53.6	2 50.0	2 46 59.8	3 13.0	9.862 2761	- 11
	25	314 31 21.2	1 34 54.8	2 42.1	2 53 10.3	2 57.4	9.862 2694	56
	27	317 41 12.0	1 34 56.1	2 32.2	2 58 49.2	2 41.4	9.862 2537	101
	29	320 51 05.8	1 34 57.7	2 20.5	3 03 55.4	2 24.8	9.862 2290	146
June	31	324 01 02.8	1 34 59.4	+2 07.0	-3 08 28.1	-2 07.8	9.862 1954	-190
	2	327 11 03.4	1 35 01.2	1 52.0	3 12 26.4	1 50.4	9.862 1530	234
	4	330 21 07.8	1 35 03.2	1 35.6	3 15 49.5	1 32.7	9.862 1020	277
	6	333 31 16.3	1 35 05.3	1 18.1	3 18 36.9	1 14.6	9.862 0423	319
	8	336 41 29.1	1 35 07.5	0 59.6	3 20 47.8	0 56.3	9.861 9744	360
	10	339 51 46.4	1 35 09.8	+0 40.3	-3 22 22.1	-0 37.9	9.861 8982	-401
	12	343 02 08.4	1 35 12.2	0 20.6	3 23 19.2	0 19.2	9.861 8142	440
	14	346 12 35.2	1 35 14.7	+0 00.6	3 23 39.0	-0 00.6	9.861 7225	477
	16	349 23 07.2	1 35 17.2	-0 19.4	3 23 21.4	+0 18.2	9.861 6233	514
	18	352 33 44.2	1 35 19.9	0 39.2	3 22 26.4	0 36.8	9.861 5171	549
	20	355 44 26.6	1 35 22.5	-0 58.5	-3 20 54.1	+0 55.5	9.861 4040	-582
	22	358 55 14.4	1 35 25.3	1 17.1	3 18 44.7	1 13.9	9.861 2845	613
	24	2 06 07.8	1 35 28.1	1 34.8	3 15 58.6	1 32.2	9.861 1589	643
	26	5 17 06.7	1 35 30.9	1 51.3	3 12 36.2	1 50.2	9.861 0276	670
	28	8 28 11.3	1 35 33.8	2 06.4	3 08 38.0	2 07.9	9.860 8910	696
July	30	11 39 21.8	1 35 36.7	-2 20.0	-3 04 04.8	+2 25.3	9.860 7494	-719
	2	14 50 38.0	1 35 39.6	-2 31.9	-2 58 57.3	+2 42.2	9.860 6034	-740

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	° ' "	' "	° ' "	' "		
July	2	14 50 38.0	1 35 39.6	-2 31.9	-2 58 57.3	+2 42.2	9.860 6034	-740
	4	18 02 00.3	1 35 42.6	2 41.9	2 53 16.3	2 58.7	9.860 4534	760
	6	21 13 28.5	1 35 45.7	2 49.9	2 47 03.0	3 14.6	9.860 2998	776
	8	24 25 02.9	1 35 48.7	2 55.8	2 40 18.3	3 30.0	9.860 1431	791
	10	27 36 43.5	1 35 51.8	2 59.6	2 33 03.5	3 44.7	9.859 9838	802
	12	30 48 30.3	1 35 55.0	-3 01.1	-2 25 19.9	+3 58.8	9.859 8223	-812
	14	34 00 23.5	1 35 58.2	3 00.3	2 17 08.7	4 12.2	9.859 6592	819
	16	37 12 23.1	1 36 01.4	2 57.3	2 08 31.6	4 24.8	9.859 4950	823
	18	40 24 29.2	1 36 04.7	2 52.1	1 59 30.1	4 36.6	9.859 3302	825
	20	43 36 42.0	1 36 08.0	2 44.7	1 50 05.7	4 47.6	9.859 1652	824
	22	46 49 01.4	1 36 11.4	-2 35.2	-1 40 20.2	+4 57.7	9.859 0007	-821
	24	50 01 27.7	1 36 14.8	2 23.9	1 30 15.5	5 06.9	9.858 8371	815
	26	53 14 00.8	1 36 18.3	2 10.7	1 19 53.4	5 15.1	9.858 6750	806
	28	56 26 40.8	1 36 21.8	1 55.8	1 09 15.7	5 22.4	9.858 5148	795
	30	59 39 27.8	1 36 25.3	1 39.5	0 58 24.6	5 28.6	9.858 3572	781
Aug.	1	62 52 21.9	1 36 28.8	-1 21.9	-0 47 21.9	+5 33.9	9.858 2024	-765
	3	66 05 23.2	1 36 32.4	1 03.2	0 36 09.8	5 38.1	9.858 0512	747
	5	69 18 31.6	1 36 36.0	0 43.8	0 24 50.4	5 41.2	9.857 9039	726
	7	72 31 47.1	1 36 39.6	0 23.8	0 13 25.8	5 43.2	9.857 7610	703
	9	75 45 09.9	1 36 43.2	-0 03.5	-0 01 58.3	5 44.2	9.857 6230	677
	11	78 58 39.9	1 36 46.8	+0 16.9	+0 09 30.1	+5 44.0	9.857 4903	-649
	13	82 12 17.0	1 36 50.4	0 37.1	0 20 57.0	5 42.8	9.857 3634	619
	15	85 26 01.3	1 36 53.9	0 56.8	0 32 20.4	5 40.4	9.857 2427	588
	17	88 39 52.5	1 36 57.4	1 15.8	0 43 38.0	5 37.0	9.857 1285	554
	19	91 53 50.7	1 37 00.8	1 33.8	0 54 47.5	5 32.4	9.857 0213	518
	21	95 07 55.6	1 37 04.1	+1 50.7	+1 05 47.0	+5 26.8	9.856 9213	-481
	23	98 22 07.0	1 37 07.3	2 06.1	1 16 34.1	5 20.1	9.856 8289	442
	25	101 36 24.8	1 37 10.5	2 20.0	1 27 06.9	5 12.4	9.856 7445	402
	27	104 50 48.8	1 37 13.4	2 32.1	1 37 23.1	5 03.7	9.856 6683	360
	29	108 05 18.5	1 37 16.3	2 42.2	1 47 20.9	4 53.9	9.856 6005	317
Sept.	31	111 19 53.7	1 37 18.9	+2 50.2	+1 56 58.3	+4 43.2	9.856 5414	-274
	2	114 34 34.1	1 37 21.4	2 56.1	2 06 13.3	4 31.6	9.856 4911	229
	4	117 49 19.2	1 37 23.6	2 59.7	2 15 04.2	4 19.1	9.856 4499	183
	6	121 04 08.5	1 37 25.7	3 01.0	2 23 29.2	4 05.7	9.856 4178	137
	8	124 19 01.6	1 37 27.4	3 00.1	2 31 26.6	3 51.6	9.856 3950	91
	10	127 33 58.1	1 37 29.0	+2 56.7	+2 38 55.0	+3 36.6	9.856 3816	- 44
	12	130 48 57.3	1 37 30.2	2 51.1	2 45 52.7	3 21.0	9.856 3775	+ 3
	14	134 03 58.6	1 37 31.1	2 43.3	2 52 18.4	3 04.7	9.856 3828	50
	16	137 19 01.5	1 37 31.7	2 33.4	2 58 10.9	2 47.8	9.856 3976	97
	18	140 34 05.3	1 37 32.0	2 21.6	3 03 29.1	2 30.3	9.856 4216	144
	20	143 49 09.4	1 37 32.0	+2 07.9	+3 08 11.8	+2 12.4	9.856 4550	+190
	22	147 04 13.1	1 37 31.6	1 52.6	3 12 18.2	1 54.0	9.856 4974	235
	24	150 19 15.8	1 37 30.9	1 35.8	3 15 47.5	1 35.3	9.856 5489	280
	26	153 34 16.6	1 37 29.9	1 17.8	3 18 39.1	1 16.2	9.856 6092	323
	28	156 49 15.0	1 37 28.4	0 58.8	3 20 52.3	0 57.0	9.856 6782	366
Oct.	30	160 04 10.1	1 37 26.7	+0 39.1	+3 22 26.9	+0 37.5	9.856 7556	+407
	2	163 19 01.4	1 37 24.6	+0 18.9	+3 23 22.5	+0 18.0	9.856 8411	+448

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	° ' "	' "	° ' "	' "		
Oct.	2	163 19 01.4	1 37 24.6	+0 18.9	+3 23 22.5	+0 18.0	9.856 8411	+448
	4	166 33 48.1	1 37 22.1	-0 01.6	3 23 39.0	-0 01.5	9.856 9345	486
	6	169 48 29.6	1 37 19.3	0 22.1	3 23 16.3	0 21.1	9.857 0355	523
	8	173 03 05.2	1 37 16.2	0 42.2	3 22 14.8	0 40.5	9.857 1438	559
	10	176 17 34.2	1 37 12.8	1 01.8	3 20 34.5	0 59.8	9.857 2589	592
	12	179 31 56.0	1 37 09.0	-1 20.6	+3 18 15.8	-1 18.8	9.857 3805	+624
	14	182 46 10.2	1 37 05.1	1 38.3	3 15 19.4	1 37.6	9.857 5083	653
	16	186 00 16.1	1 37 00.8	1 54.8	3 11 45.7	1 56.0	9.857 6417	681
	18	189 14 13.2	1 36 56.3	2 09.9	3 07 35.7	2 14.0	9.857 7804	706
	20	192 28 01.1	1 36 51.6	2 23.3	3 02 50.1	2 31.5	9.857 9240	729
	22	195 41 39.5	1 36 46.7	-2 34.8	+2 57 30.0	-2 48.5	9.858 0719	+750
	24	198 55 07.8	1 36 41.6	2 44.3	2 51 36.4	3 05.0	9.858 2237	768
	26	202 08 25.8	1 36 36.4	2 51.8	2 45 10.5	3 20.8	9.858 3789	784
	28	205 21 33.4	1 36 31.1	2 57.2	2 38 13.7	3 35.9	9.858 5371	797
	30	208 34 30.1	1 36 25.7	3 00.3	2 30 47.3	3 50.3	9.858 6976	808
Nov.	1	211 47 16.1	1 36 20.2	-3 01.1	+2 22 52.8	-4 04.0	9.858 8601	+816
	3	214 59 51.0	1 36 14.7	2 59.6	2 14 31.8	4 16.9	9.859 0239	822
	5	218 12 15.0	1 36 09.2	2 55.9	2 05 46.0	4 28.9	9.859 1886	825
	7	221 24 28.0	1 36 03.8	2 50.0	1 56 36.9	4 40.0	9.859 3537	825
	9	224 36 30.1	1 35 58.4	2 41.9	1 47 06.4	4 50.3	9.859 5186	823
	11	227 48 21.5	1 35 53.0	-2 31.9	+1 37 16.4	-4 59.6	9.859 6829	+819
	13	231 00 02.3	1 35 47.8	2 20.0	1 27 08.7	5 08.0	9.859 8459	811
	15	234 11 32.8	1 35 42.7	2 06.4	1 16 45.1	5 15.4	9.860 0072	802
	17	237 22 53.3	1 35 37.8	1 51.2	1 06 07.8	5 21.8	9.860 1664	789
	19	240 34 04.0	1 35 33.0	1 34.7	0 55 18.7	5 27.2	9.860 3229	775
	21	243 45 05.3	1 35 28.4	-1 17.0	+0 44 19.8	-5 31.6	9.860 4762	+758
	23	246 55 57.8	1 35 24.0	0 58.3	0 33 13.2	5 34.9	9.860 6259	739
	25	250 06 41.7	1 35 19.9	0 38.9	0 22 00.9	5 37.2	9.860 7715	717
	27	253 17 17.6	1 35 16.0	-0 19.1	+0 10 44.9	5 38.5	9.860 9125	693
	29	256 27 45.9	1 35 12.4	+0 00.9	-0 00 32.6	5 38.8	9.861 0486	667
Dec.	1	259 38 07.2	1 35 09.0	+0 20.9	-0 11 49.6	-5 38.0	9.861 1794	+640
	3	262 48 22.1	1 35 05.9	0 40.7	0 23 04.0	5 36.2	9.861 3044	610
	5	265 58 31.0	1 35 03.1	1 00.0	0 34 13.8	5 33.4	9.861 4232	578
	7	269 08 34.7	1 35 00.6	1 18.5	0 45 16.9	5 29.6	9.861 5355	545
	9	272 18 33.5	1 34 58.3	1 36.0	0 56 11.5	5 24.8	9.861 6410	510
	11	275 28 28.2	1 34 56.4	+1 52.3	-1 06 55.4	-5 19.0	9.861 7394	+473
	13	278 38 19.2	1 34 54.7	2 07.3	1 17 26.8	5 12.3	9.861 8302	435
	15	281 48 07.3	1 34 53.4	2 20.7	1 27 43.8	5 04.6	9.861 9134	396
	17	284 57 52.9	1 34 52.3	2 32.4	1 37 44.6	4 56.0	9.861 9886	356
	19	288 07 36.7	1 34 51.5	2 42.3	1 47 27.3	4 46.5	9.862 0556	314
	21	291 17 19.1	1 34 51.0	+2 50.1	-1 56 50.2	-4 36.2	9.862 1142	+272
	23	294 27 00.7	1 34 50.7	2 55.9	2 05 51.7	4 25.1	9.862 1643	229
	25	297 36 42.1	1 34 50.7	2 59.5	2 14 30.1	4 13.2	9.862 2056	185
	27	300 46 23.7	1 34 51.0	3 01.0	2 22 43.9	4 00.5	9.862 2381	140
	29	303 56 06.1	1 34 51.4	3 00.3	2 30 31.5	3 47.1	9.862 2617	95
	31	307 05 49.6	1 34 52.2	+2 57.4	-2 37 51.7	-3 33.0	9.862 2763	+ 50
	33	310 15 34.8	1 34 53.1	+2 52.3	-2 44 43.0	-3 18.2	9.862 2818	+ 5

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME												Transit, Meridian of Green- wich		
Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax			
	h	m	s	s	°	'	"	"		"	"	h	m	
Jan.	0	16	14	24.51	+175.72	-21	08	03.8	2.282 598	-6134	2.05	3.86	9	37.4
	1	16	17	20.23	176.16	21	15	59.1	2.276 464	6165	2.06	3.87	9	36.4
	2	16	20	16.39	176.60	21	23	43.5	2.270 299	6196	2.06	3.88	9	35.4
	3	16	23	12.99	177.03	21	31	16.9	2.264 103	6226	2.07	3.89	9	34.4
	4	16	26	10.02	177.47	21	38	39.1	2.257 877	6255	2.07	3.90	9	33.4
	5	16	29	07.49	+177.90	-21	45	50.1	2.251 622	-6284	2.08	3.91	9	32.4
	6	16	32	05.39	178.33	21	52	49.8	2.245 338	6312	2.08	3.92	9	31.4
	7	16	35	03.72	178.75	21	59	38.0	2.239 026	6341	2.09	3.93	9	30.5
	8	16	38	02.47	179.17	22	06	14.6	2.232 685	6369	2.10	3.94	9	29.5
	9	16	41	01.64	179.59	22	12	39.5	2.226 316	6396	2.10	3.95	9	28.6
	10	16	44	01.23	+180.00	-22	18	52.7	2.219 920	-6424	2.11	3.96	9	27.6
	11	16	47	01.23	180.39	22	24	54.0	2.213 496	6452	2.11	3.98	9	26.7
	12	16	50	01.62	180.79	22	30	43.2	2.207 044	6478	2.12	3.99	9	25.7
	13	16	53	02.41	181.18	22	36	20.4	2.200 566	6506	2.13	4.00	9	24.8
	14	16	56	03.59	181.55	22	41	45.4	2.194 060	6532	2.13	4.01	9	23.9
	15	16	59	05.14	+181.92	-22	46	58.1	2.187 528	-6559	2.14	4.02	9	23.0
	16	17	02	07.06	182.26	22	51	58.4	2.180 969	6584	2.15	4.03	9	22.1
	17	17	05	09.32	182.62	22	56	46.3	2.174 385	6609	2.15	4.05	9	21.2
	18	17	08	11.94	182.95	23	01	21.6	2.167 776	6633	2.16	4.06	9	20.3
	19	17	11	14.89	183.28	23	05	44.3	2.161 143	6657	2.17	4.07	9	19.4
	20	17	14	18.17	+183.59	-23	09	54.2	2.154 486	-6681	2.17	4.08	9	18.5
	21	17	17	21.76	183.89	23	13	51.3	2.147 805	6702	2.18	4.10	9	17.6
	22	17	20	25.65	184.18	23	17	35.5	2.141 103	6724	2.19	4.11	9	16.7
	23	17	23	29.83	184.47	23	21	06.8	2.134 379	6744	2.19	4.12	9	15.9
	24	17	26	34.30	184.73	23	24	25.0	2.127 635	6764	2.20	4.14	9	15.0
	25	17	29	39.03	+185.01	-23	27	30.1	2.120 871	-6783	2.21	4.15	9	14.1
	26	17	32	44.04	185.25	23	30	22.1	2.114 088	6801	2.21	4.16	9	13.3
	27	17	35	49.29	185.50	23	33	00.8	2.107 287	6818	2.22	4.18	9	12.4
	28	17	38	54.79	185.73	23	35	26.1	2.100 469	6835	2.23	4.19	9	11.6
	29	17	42	00.52	185.96	23	37	38.2	2.093 634	6851	2.24	4.20	9	10.7
Feb.	30	17	45	06.48	+186.17	-23	39	36.8	2.086 783	-6865	2.24	4.22	9	09.9
	31	17	48	12.65	186.38	23	41	22.0	2.079 918	6880	2.25	4.23	9	09.1
	1	17	51	19.03	186.57	23	42	53.6	2.073 038	6894	2.26	4.24	9	08.2
	2	17	54	25.60	186.77	23	44	11.7	2.066 144	6906	2.27	4.26	9	07.4
	3	17	57	32.37	186.95	23	45	16.1	2.059 238	6920	2.27	4.27	9	06.6
	4	18	00	39.32	+187.12	-23	46	06.9	2.052 318	-6931	2.28	4.29	9	05.7
	5	18	03	46.44	187.28	23	46	44.1	2.045 387	6944	2.29	4.30	9	04.9
	6	18	06	53.72	187.43	23	47	07.5	2.038 443	6955	2.30	4.32	9	04.1
	7	18	10	01.15	187.58	23	47	17.1	2.031 488	6967	2.30	4.33	9	03.3
	8	18	13	08.73	187.71	23	47	13.0	2.024 521	6978	2.31	4.35	9	02.5
	9	18	16	16.44	+187.83	-23	46	55.1	2.017 543	-6990	2.32	4.36	9	01.6
	10	18	19	24.27	187.94	23	46	23.4	2.010 553	7001	2.33	4.38	9	00.8
	11	18	22	32.21	188.02	23	45	37.8	2.003 552	7012	2.34	4.39	9	00.0
	12	18	25	40.23	188.11	23	44	38.4	1.996 540	7022	2.34	4.41	8	59.2
	13	18	28	48.34	188.17	23	43	25.2	1.989 518	7033	2.35	4.42	8	58.4
14	18	31	56.51	+188.22	-23	41	58.2	1.982 485	-7041	2.36	4.44	8	57.6	
15	18	35	04.73		-23	40	17.3	1.975 444		2.37	4.45	8	56.8	

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"				h	m
Feb. 15	18	35	04.73		-23	40	17.3		1.975 444				
16	18	38	12.99	+188.26	23	38	22.6	+114.7	1.968 393	-7051	2.37	4.45	8 56.8
17	18	41	21.27	188.28	23	36	14.1	128.5	1.961 334	7059	2.38	4.47	8 56.0
18	18	44	29.56	188.29	23	33	51.8	142.3	1.954 267	7067	2.39	4.49	8 55.2
19	18	47	37.85	188.29	23	31	15.7	156.1	1.947 193	7074	2.39	4.50	8 54.4
				188.27				169.8		7081	2.40	4.52	8 53.6
20	18	50	46.12		-23	28	25.9		1.940 112		2.41	4.54	8 52.8
21	18	53	54.37	+188.25	23	25	22.3	+183.6	1.933 027	-7085	2.42	4.55	8 52.0
22	18	57	02.57	188.20	23	02	05.0	197.3	1.925 936	7091	2.43	4.57	8 51.2
23	19	00	10.72	188.15	23	18	34.0	211.0	1.918 842	7094	2.44	4.59	8 50.4
24	19	03	18.81	188.09	23	14	49.4	224.6	1.911 743	7099	2.45	4.60	8 49.6
				188.01				238.3		7100			
25	19	06	26.82		-23	10	51.1		1.904 643		2.46	4.62	8 48.7
26	19	09	34.74	+187.92	23	06	39.3	+251.8	1.897 541	-7102	2.47	4.64	8 47.9
27	19	12	42.57	187.83	23	02	13.9	265.4	1.890 437	7104	2.48	4.66	8 47.1
28	19	15	50.30	187.73	22	57	35.1	278.8	1.883 333	7104	2.48	4.67	8 46.3
Mar. 1	19	18	57.92	187.62	22	52	42.8	292.3	1.876 229	7104	2.49	4.69	8 45.5
				187.49				305.7		7103			
2	19	22	05.41		-22	47	37.1		1.869 126		2.50	4.71	8 44.7
3	19	25	12.78	+187.37	22	42	18.1	+319.0	1.862 025	-7101	2.51	4.73	8 43.9
4	19	28	20.00	187.22	22	36	45.7	332.4	1.854 926	7099	2.52	4.74	8 43.0
5	19	31	27.09	187.09	22	31	00.2	345.5	1.847 828	7098	2.53	4.76	8 42.2
6	19	34	34.03	186.94	22	25	01.4	358.8	1.840 734	7094	2.54	4.78	8 41.4
				186.78				371.8		7093			
7	19	37	40.81		-22	18	49.6		1.833 641		2.55	4.80	8 40.6
8	19	40	47.42	+186.61	22	12	24.7	+384.9	1.826 552	-7089	2.56	4.82	8 39.7
9	19	43	53.87	186.45	22	05	46.9	397.8	1.819 465	7087	2.57	4.84	8 38.9
10	19	47	00.13	186.26	22	05	46.9	410.8	1.812 380	7085	2.58	4.86	8 38.0
11	19	50	06.20	186.07	21	58	56.1	423.4	1.805 299	7081	2.59	4.87	8 37.2
				185.87				436.2		7079			
12	19	53	12.07		-21	44	36.5		1.798 220		2.60	4.89	8 36.4
13	19	56	17.73	+185.66	21	37	07.7	+448.8	1.791 144	-7076	2.61	4.91	8 35.5
14	19	59	23.16	185.43	21	29	26.5	461.2	1.784 072	7072	2.62	4.93	8 34.7
15	20	02	28.37	185.21	21	21	32.8	473.7	1.777 003	7069	2.63	4.95	8 33.8
16	20	05	33.33	184.96	21	13	26.9	485.9	1.769 939	7064	2.64	4.97	8 32.9
				184.71				498.1		7060			
17	20	08	38.04		-21	05	08.8		1.762 879		2.65	4.99	8 32.1
18	20	11	42.50	+184.46	20	56	38.6	+510.2	1.755 823	-7056	2.67	5.01	8 31.2
19	20	14	46.68	184.18	20	47	56.5	522.1	1.748 774	7049	2.68	5.03	8 30.3
20	20	17	50.58	183.90	20	39	02.6	533.9	1.741 730	7044	2.69	5.05	8 29.5
21	20	20	54.20	183.62	20	29	56.9	545.7	1.734 693	7037	2.70	5.07	8 28.6
				183.33				557.2		7031			
22	20	23	57.53		-20	20	39.7		1.727 662		2.71	5.09	8 27.7
23	20	27	00.56	+183.03	20	11	11.0	+568.7	1.720 640	-7022	2.72	5.11	8 26.8
24	20	30	03.29	182.73	20	01	30.9	580.1	1.713 626	7014	2.73	5.14	8 25.9
25	20	33	05.70	182.41	19	51	39.5	591.4	1.706 620	7006	2.74	5.16	8 25.0
26	20	36	07.80	182.10	19	41	37.1	602.4	1.699 624	6996	2.75	5.18	8 24.1
				181.77				613.4		6986			
27	20	39	09.57		-19	31	23.7		1.692 638		2.76	5.20	8 23.2
28	20	42	11.03	+181.46	19	20	59.4	+624.3	1.685 663	-6975	2.78	5.22	8 22.2
29	20	45	12.15	181.12	19	10	24.3	635.1	1.678 698	6965	2.79	5.24	8 21.3
30	20	48	12.95	180.80	18	59	38.6	645.7	1.671 746	6952	2.80	5.26	8 20.4
31	20	51	13.42	180.47	18	48	42.5	656.1	1.664 805	6941	2.81	5.29	8 19.4
				180.14				666.6		6928			
Apr. 1	20	54	13.56		-18	37	35.9		1.657 877		2.82	5.31	8 18.5
2	20	57	13.37	+179.81	-18	26	19.2	+676.7	1.650 961	-6916	2.83	5.33	8 17.6

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME															Transit, Meridian of Green- wich	
Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- ax			
		h	m	s	s	°	'	"	"			"	"	h	m	
Apr.	1	20	54	13.56		-18	37	35.9		1.657	877		2.82	5.31	8	18.5
	2	20	57	13.37	+179.81	18	26	19.2	+676.7	1.650	961	-6916	2.83	5.33	8	17.6
	3	21	00	12.85	179.48	18	14	52.2	687.0	1.644	058	6903	2.85	5.35	8	16.6
	4	21	03	12.00	179.15	18	03	15.4	696.8	1.637	169	6889	2.86	5.38	8	15.7
	5	21	06	10.81	178.81	17	51	28.7	706.7	1.630	292	6877	2.87	5.40	8	14.7
					178.49				716.5			6865				
	6	21	09	09.30		-17	39	32.2		1.623	427		2.88	5.42	8	13.7
	7	21	12	07.46	+178.16	17	27	26.3	+725.9	1.616	575	-6852	2.90	5.44	8	12.7
	8	21	15	05.28	177.82	17	15	10.9	735.4	1.609	736	6839	2.91	5.47	8	11.8
	9	21	18	02.76	177.48	17	02	46.3	744.6	1.602	908	6828	2.92	5.49	8	10.8
	10	21	20	59.90	177.14	16	50	12.6	753.7	1.596	093	6815	2.93	5.51	8	09.8
					176.80				762.5			6804				
	11	21	23	56.70		-16	37	30.1		1.589	289		2.94	5.54	8	08.8
	12	21	26	53.15	+176.45	16	24	38.8	+771.3	1.582	498	-6791	2.96	5.56	8	07.8
	13	21	29	49.25	176.10	16	11	38.9	779.9	1.575	719	6779	2.97	5.58	8	06.8
	14	21	32	44.99	175.74	15	58	30.6	788.3	1.568	953	6766	2.98	5.61	8	05.8
	15	21	35	40.38	175.39	15	45	14.1	796.5	1.562	200	6753	3.00	5.63	8	04.7
					175.03				804.6			6741				
	16	21	38	35.41		-15	31	49.5		1.555	459		3.01	5.66	8	03.7
	17	21	41	30.08	+174.67	15	18	17.1	+812.4	1.548	732	-6727	3.02	5.68	8	02.7
	18	21	44	24.39	174.31	15	04	36.9	820.2	1.542	018	6714	3.03	5.71	8	01.6
	19	21	47	18.33	173.94	14	50	49.1	827.8	1.535	319	6699	3.05	5.73	8	00.6
	20	21	50	11.91	173.58	14	36	54.0	835.1	1.528	633	6686	3.06	5.76	7	59.5
					173.21				842.3			6671				
	21	21	53	05.12		-14	22	51.7		1.521	962		3.07	5.78	7	58.5
	22	21	55	57.97	+172.85	14	08	42.3	+849.4	1.515	306	-6656	3.09	5.81	7	57.4
	23	21	58	50.45	172.48	13	54	26.0	856.3	1.508	666	6640	3.10	5.83	7	56.4
	24	22	01	42.56	172.11	13	40	03.1	862.9	1.502	041	6625	3.12	5.86	7	55.3
	25	22	04	34.31	171.75	13	25	33.5	869.6	1.495	432	6609	3.13	5.88	7	54.2
					171.39				875.9			6592				
26	22	07	25.70		-13	10	57.6		1.488	840		3.14	5.91	7	53.1	
27	22	10	16.74	+171.04	12	56	15.5	+882.1	1.482	265	-6575	3.16	5.94	7	52.0	
28	22	13	07.42	170.68	12	41	27.2	888.3	1.475	707	6558	3.17	5.96	7	50.9	
29	22	15	57.75	170.33	12	26	33.1	894.1	1.469	166	6541	3.19	5.99	7	49.8	
30	22	18	47.74	169.99	12	11	33.2	899.9	1.462	642	6524	3.20	6.02	7	48.7	
				169.66				905.6			6505					
May	1	22	21	37.40		-11	56	27.6		1.456	137		3.21	6.04	7	47.6
	2	22	24	26.71	+169.31	11	41	16.7	+910.9	1.449	648	-6489	3.23	6.07	7	46.5
	3	22	27	15.70	168.99	11	26	00.4	916.3	1.443	177	6471	3.24	6.10	7	45.3
	4	22	30	04.37	168.67	11	10	39.1	921.3	1.436	722	6455	3.26	6.13	7	44.2
	5	22	32	52.72	168.35	10	55	12.8	926.3	1.430	284	6438	3.27	6.15	7	43.1
					168.03				931.1			6422				
	6	22	35	40.75		-10	39	41.7		1.423	862		3.29	6.18	7	41.9
	7	22	38	28.47	+167.72	10	24	06.0	+935.7	1.417	456	-6406	3.30	6.21	7	40.8
	8	22	41	15.87	167.40	10	08	26.0	940.0	1.411	065	6391	3.32	6.24	7	39.6
	9	22	44	02.97	167.10	9	52	41.7	944.3	1.404	689	6376	3.33	6.26	7	38.5
	10	22	46	49.75	166.78	9	36	53.4	948.3	1.398	328	6361	3.35	6.29	7	37.3
					166.47				952.1			6346				
	11	22	49	36.22		-9	21	01.3		1.391	982		3.36	6.32	7	36.1
	12	22	52	22.37	+166.15	9	05	05.5	+955.8	1.385	651	-6331	3.38	6.35	7	35.0
	13	22	55	08.22	165.85	8	49	06.3	959.2	1.379	335	6316	3.39	6.38	7	33.8
	14	22	57	53.75	165.53	8	33	03.9	962.4	1.373	033	6302	3.41	6.41	7	32.6
	15	23	00	38.97	165.22	8	16	58.3	965.6	1.366	746	6287	3.42	6.44	7	31.4
				164.91				968.4			6272					
16	23	03	23.88		-8	00	49.9		1.360	474		3.44	6.47	7	30.2	
17	23	06	08.48	+164.60	-7	44	38.8	+971.1	1.354	216	-6258	3.46	6.50	7	29.0	

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"		"	"	h m
May 17	23	06	08.48	+164.29	-7	44	38.8	+973.6	1.354 216	-6243	3.46	7 29.0
18	23	08	52.77	163.98	7	28	25.2	976.0	1.347 973	6228	3.47	7 27.8
19	23	11	36.75	163.67	7	12	09.2	978.1	1.341 745	6212	3.49	7 26.6
20	23	14	20.42	163.37	6	55	51.1	980.0	1.335 533	6197	3.50	7 25.4
21	23	17	03.79	163.06	6	39	31.1	981.9	1.329 336	6181	3.52	7 24.2
22	23	19	46.85	+162.76	-6	23	09.2	+983.5	1.323 155	-6166	3.54	7 22.9
23	23	22	29.61	162.46	6	06	45.7	984.9	1.316 989	6150	3.55	7 21.7
24	23	25	12.07	162.17	5	50	20.8	986.3	1.310 839	6133	3.57	7 20.5
25	23	27	54.24	161.87	5	33	54.5	987.3	1.304 706	6117	3.59	7 19.2
26	23	30	36.11	161.59	5	17	27.2	988.3	1.298 589	6101	3.60	7 18.0
27	23	33	17.70	+161.32	-5	00	58.9	+989.1	1.292 488	-6084	3.62	7 16.7
28	23	35	59.02	161.03	4	44	29.8	989.8	1.286 404	6068	3.64	7 15.5
29	23	38	40.05	160.77	4	28	00.0	990.3	1.280 336	6052	3.66	7 14.2
30	23	41	20.82	160.51	4	11	29.7	990.6	1.274 284	6036	3.67	7 13.0
31	23	44	01.33	160.25	3	54	59.1	990.8	1.268 248	6021	3.69	7 11.7
June 1	23	46	41.58	+159.99	-3	38	28.3	+990.7	1.262 227	-6007	3.71	7 10.4
2	23	49	21.57	159.75	3	21	57.6	990.7	1.256 220	5992	3.73	7 09.1
3	23	52	01.32	159.49	3	05	26.9	990.3	1.250 228	5978	3.74	7 07.9
4	23	54	40.81	159.25	2	48	56.6	989.8	1.244 250	5965	3.76	7 06.6
5	23	57	20.06	159.01	2	32	26.8	989.1	1.238 285	5952	3.78	7 05.3
6	23	59	59.07	+158.76	-2	15	57.7	+988.2	1.232 333	-5940	3.80	7 04.0
7	0	02	37.83	158.50	1	59	29.5	987.1	1.226 393	5928	3.82	7 02.7
8	0	05	16.33	158.25	1	43	02.4	985.9	1.220 465	5917	3.83	7 01.4
9	0	07	54.58	158.01	1	26	36.5	984.4	1.214 548	5905	3.85	7 00.1
10	0	10	32.59	157.74	1	10	12.1	982.8	1.208 643	5894	3.87	6 58.8
11	0	13	10.33	+157.49	-0	53	49.3	+981.0	1.202 749	-5883	3.89	6 57.5
12	0	15	47.82	157.23	0	37	28.3	979.1	1.196 866	5872	3.91	6 56.2
13	0	18	25.05	156.96	0	21	09.2	976.8	1.190 994	5861	3.93	6 54.8
14	0	21	02.01	156.70	-0	04	52.4	974.5	1.185 133	5851	3.95	6 53.5
15	0	23	38.71	156.42	+0	11	22.1	972.0	1.179 282	5840	3.97	6 52.2
16	0	26	15.13	+156.16	+0	27	34.1	+969.4	1.173 442	-5830	3.99	6 50.8
17	0	28	51.29	155.88	0	43	43.5	966.5	1.167 612	5819	4.01	6 49.5
18	0	31	27.17	155.60	0	59	50.0	963.4	1.161 793	5808	4.03	6 48.2
19	0	34	02.77	155.33	1	15	53.4	960.3	1.155 985	5796	4.05	6 46.8
20	0	36	38.10	155.04	1	31	53.7	957.0	1.150 187	5786	4.07	6 45.5
21	0	39	13.14	+154.76	+1	47	50.7	+953.5	1.144 401	-5775	4.09	6 44.1
22	0	41	47.90	154.48	2	03	44.2	949.9	1.138 626	5765	4.11	6 42.7
23	0	44	22.38	154.19	2	19	34.1	946.1	1.132 861	5753	4.13	6 41.4
24	0	46	56.57	153.92	2	35	20.2	942.2	1.127 108	5742	4.15	6 40.0
25	0	49	30.49	153.63	2	51	02.4	938.2	1.121 366	5732	4.17	6 38.6
26	0	52	04.12	+153.36	+3	06	40.6	+934.1	1.115 634	-5720	4.19	6 37.2
27	0	54	37.48	153.08	3	22	14.7	929.8	1.109 914	5711	4.22	6 35.8
28	0	57	10.56	152.81	3	37	44.5	925.4	1.104 203	5701	4.24	6 34.5
29	0	59	43.37	152.53	3	53	09.9	920.8	1.098 502	5691	4.26	6 33.1
30	1	02	15.90	152.25	4	08	30.7	916.1	1.092 811	5683	4.28	6 31.7
July 1	1	04	48.15	+151.96	+4	23	46.8	+911.3	1.087 128	-5674	4.30	6 30.3
2	1	07	20.11		+4	38	58.1		1.081 454		4.33	6 28.8

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME															Transit, Meridian of Green- wich	
Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- ax			
		h	m	s	s	°	'	"	"			"	"	h	m	
July	1	1	04	48.15		+	4	23	46.8	1.087 128	-5674	4.30	8.09	6	30.3	
	2	1	07	20.11	+151.96		4	38	58.1	1.081 454	5667	4.33	8.14	6	28.8	
	3	1	09	51.79	151.68		4	54	04.4	1.075 787	5660	4.35	8.18	6	27.4	
	4	1	12	23.17	151.38		5	09	05.5	1.070 127	5653	4.37	8.22	6	26.0	
	5	1	14	54.25	151.08		5	24	01.4	1.064 474	5647	4.40	8.27	6	24.6	
					150.77											
	6	1	17	25.02		+	5	38	51.9	1.058 827	-5641	4.42	8.31	6	23.2	
	7	1	19	55.48	+150.46		5	53	36.8	1.053 186	5636	4.44	8.36	6	21.7	
	8	1	22	25.60	150.12		6	08	15.9	1.047 550	5631	4.47	8.40	6	20.3	
	9	1	24	55.39	149.79		6	22	49.3	1.041 919	5627	4.49	8.45	6	18.8	
	10	1	27	24.82	149.43		6	37	16.6	1.036 292	5621	4.52	8.49	6	17.4	
					149.08											
	11	1	29	53.90		+	6	51	37.7	1.030 671	-5618	4.54	8.54	6	15.9	
	12	1	32	22.60	+148.70		7	05	52.5	1.025 053	5612	4.57	8.58	6	14.5	
	13	1	34	50.92	148.32		7	20	00.9	1.019 441	5609	4.59	8.63	6	13.0	
	14	1	37	18.84	147.92		7	34	02.7	1.013 832	5605	4.62	8.68	6	11.5	
	15	1	39	46.35	147.51		7	47	57.8	1.008 227	5600	4.64	8.73	6	10.0	
					147.08											
	16	1	42	13.43		+	8	01	46.1	1.002 627	-5596	4.67	8.78	6	08.5	
	17	1	44	40.08	+146.65		8	15	27.5	0.997 031	5592	4.69	8.83	6	07.0	
	18	1	47	06.27	146.19		8	29	01.8	0.991 439	5587	4.72	8.88	6	05.5	
	19	1	49	32.01	145.74		8	42	29.0	0.985 852	5582	4.75	8.93	6	04.0	
	20	1	51	57.27	145.26		8	55	48.8	0.980 270	5577	4.77	8.98	6	02.5	
					144.77											
	21	1	54	22.04		+	9	09	01.4	0.974 693	-5571	4.80	9.03	6	01.0	
	22	1	56	46.32	+144.28		9	22	06.5	0.969 122	5567	4.82	9.07	5	59.4	
	23	1	59	10.10	143.78		9	35	04.1	0.963 555	5561	4.86	9.13	5	57.9	
	24	2	01	33.36	143.26		9	47	54.1	0.957 994	5556	4.89	9.19	5	56.3	
	25	2	03	56.10	142.74		10	00	36.5	0.952 438	5552	4.91	9.24	5	54.8	
					142.21											
	26	2	06	18.31		+10	13	11.1		0.946 886	-5546	4.94	9.29	5	53.2	
	27	2	08	39.98	+141.67		10	25	37.9	0.941 340	5543	4.97	9.35	5	51.6	
	28	2	11	01.08	141.10		10	37	56.9	0.935 797	5539	5.00	9.40	5	50.0	
	29	2	13	21.62	140.54		10	50	07.9	0.930 258	5535	5.03	9.46	5	48.4	
	30	2	15	41.57	139.95		11	02	10.9	0.924 723	5532	5.06	9.52	5	46.8	
					139.35											
Aug.	31	2	18	00.92		+11	14	05.8	0.919 191	-5530	5.09	9.57	5	45.2		
	1	2	20	19.65	+138.73		11	25	52.5	0.913 661	5527	5.12	9.63	5	43.6	
	2	2	22	37.74	138.09		11	37	31.0	0.908 134	5526	5.15	9.69	5	41.9	
	3	2	24	55.16	137.42		11	49	01.2	0.902 608	5523	5.18	9.75	5	40.3	
	4	2	27	11.90	136.74		12	00	23.0	0.897 085	5522	5.22	9.81	5	38.6	
					136.03											
	5	2	29	27.93		+12	11	36.3	0.891 563	-5521	5.25	9.87	5	36.9		
	6	2	31	43.23	+135.30		12	22	41.1	0.886 042	5519	5.28	9.93	5	35.2	
	7	2	33	57.76	-134.53		12	33	37.3	0.880 523	5518	5.31	9.99	5	33.5	
	8	2	36	11.50	133.74		12	44	24.8	0.875 005	5517	5.35	10.06	5	31.8	
	9	2	38	24.42	132.92		12	55	03.7	0.869 488	5515	5.38	10.12	5	30.1	
					132.08											
	10	2	40	36.50		+13	05	33.8	0.863 973	-5513	5.42	10.19	5	28.3		
	11	2	42	47.70	+131.20		13	15	55.0	0.858 460	5512	5.45	10.25	5	26.6	
	12	2	44	57.99	130.29		13	26	07.4	0.852 948	5509	5.49	10.32	5	24.8	
	13	2	47	07.34	129.35		13	36	10.9	0.847 439	5507	5.52	10.38	5	23.0	
14	2	49	15.72	128.38		13	46	05.4	0.841 932	5504	5.56	10.45	5	21.2		
				127.37												
15	2	51	23.09		+13	55	51.0	0.836 428	-5500	5.60	10.52	5	19.4			
16	2	53	29.43	+126.34		+14	05	27.6	0.830 928		5.63	10.59	5	17.6		

FOR 0^h UNIVERSAL TIMETransit,
Meridian
of Green-
wich

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- ax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"		"	"	h	m
Aug. 16	2	53	29.43	+125.28	+14	05	27.6	+567.6	0.830 928	-5496	5.63	10.59	5 17.6
17	2	55	34.71	124.18	14	14	55.2	558.6	0.825 432	5491	5.67	10.66	5 15.7
18	2	57	38.89	123.06	14	24	13.8	549.6	0.819 941	5485	5.71	10.73	5 13.8
19	2	59	41.95	121.91	14	33	23.4	540.7	0.814 456	5480	5.75	10.80	5 11.9
20	3	01	43.86	120.74	14	42	24.1	531.6	0.808 976	5473	5.79	10.88	5 10.0
21	3	03	44.60	+119.52	+14	51	15.7	+522.8	0.803 503	-5467	5.82	10.95	5 08.1
22	3	05	44.12	118.30	14	59	58.5	513.8	0.798 036	5459	5.86	11.03	5 06.1
23	3	07	42.42	117.04	15	08	32.3	505.0	0.792 577	5453	5.90	11.10	5 04.2
24	3	09	39.46	115.74	15	16	57.3	496.1	0.787 124	5445	5.95	11.18	5 02.2
25	3	11	35.20	114.41	15	25	13.4	487.3	0.781 679	5437	5.99	11.26	5 00.2
26	3	13	29.61	+113.05	+15	33	20.7	+478.5	0.776 242	-5430	6.03	11.34	4 58.1
27	3	15	22.66	111.64	15	41	19.2	469.7	0.770 812	5422	6.07	11.42	4 56.1
28	3	17	14.30	110.20	15	49	08.9	460.9	0.765 390	5414	6.11	11.50	4 54.0
29	3	19	04.50	108.73	15	56	49.8	452.3	0.759 976	5405	6.16	11.58	4 51.9
30	3	20	53.23	107.19	16	04	22.1	443.5	0.754 571	5397	6.20	11.66	4 49.7
31	3	22	40.42	+105.62	+16	11	45.6	+434.9	0.749 174	-5388	6.25	11.75	4 47.6
Sept. 1	3	24	26.04	103.99	16	19	00.5	426.2	0.743 786	5378	6.29	11.83	4 45.4
2	3	26	10.03	102.32	16	26	06.7	417.7	0.738 408	5368	6.34	11.92	4 43.2
3	3	27	52.35	100.60	16	33	04.4	409.1	0.733 040	5358	6.38	12.00	4 40.9
4	3	29	32.95	98.83	16	39	53.5	400.6	0.727 682	5346	6.43	12.09	4 38.7
5	3	31	11.78	+ 97.00	+16	46	34.1	+392.2	0.722 336	-5334	6.48	12.18	4 36.4
6	3	32	48.78	95.12	16	53	06.3	383.6	0.717 002	5321	6.53	12.27	4 34.0
7	3	34	23.90	93.18	16	59	29.9	375.3	0.711 681	5307	6.58	12.36	4 31.7
8	3	35	57.08	91.18	17	05	45.2	367.0	0.706 374	5292	6.63	12.46	4 29.3
9	3	37	28.26	89.13	17	11	52.2	358.7	0.701 082	5275	6.68	12.55	4 26.9
10	3	38	57.39	+ 87.01	+17	17	50.9	+350.4	0.695 807	-5258	6.73	12.65	4 24.4
11	3	40	24.40	84.83	17	23	41.3	342.3	0.690 549	5239	6.78	12.74	4 21.9
12	3	41	49.23	82.61	17	29	23.6	334.0	0.685 310	5218	6.83	12.84	4 19.4
13	3	43	11.84	80.33	17	34	57.6	326.1	0.680 092	5196	6.88	12.94	4 16.8
14	3	44	32.17	77.98	17	40	23.7	318.0	0.674 896	5172	6.93	13.04	4 14.2
15	3	45	50.15	+ 75.59	+17	45	41.7	+310.1	0.669 724	-5146	6.99	13.14	4 11.6
16	3	47	05.74	73.15	17	50	51.8	302.3	0.664 578	5119	7.04	13.24	4 08.9
17	3	48	18.89	70.66	17	55	54.1	294.4	0.659 459	5090	7.10	13.34	4 06.2
18	3	49	29.55	68.11	18	00	48.5	286.9	0.654 369	5059	7.15	13.45	4 03.4
19	3	50	37.66	65.52	18	05	35.4	279.2	0.649 310	5027	7.21	13.55	4 00.6
20	3	51	43.18	+ 62.88	+18	10	14.6	+271.6	0.644 283	-4993	7.26	13.66	3 57.7
21	3	52	46.06	60.18	18	14	46.2	264.4	0.639 290	4958	7.32	13.77	3 54.8
22	3	53	46.24	57.43	18	19	10.6	256.8	0.634 332	4921	7.38	13.87	3 51.9
23	3	54	43.67	54.62	18	23	27.4	249.5	0.629 411	4883	7.44	13.98	3 48.9
24	3	55	38.29	51.75	18	27	36.9	242.3	0.624 528	4843	7.49	14.09	3 45.9
25	3	56	30.04	+ 48.84	+18	31	39.2	+235.1	0.619 685	-4802	7.55	14.20	3 42.8
26	3	57	18.88	45.84	18	35	34.3	227.9	0.614 883	4758	7.61	14.31	3 39.7
27	3	58	04.72	42.80	18	39	22.2	220.8	0.610 125	4713	7.67	14.42	3 36.5
28	3	58	47.52	39.69	18	43	03.0	213.7	0.605 412	4666	7.73	14.54	3 33.3
29	3	59	27.21	36.52	18	46	36.7	206.7	0.600 746	4617	7.79	14.65	3 30.0
30	4	00	03.73	+ 33.29	+18	50	03.4	+199.5	0.596 129	-4565	7.85	14.76	3 26.6
Oct. 1	4	00	37.02		+18	53	22.9		0.591 564		7.91	14.88	3 23.3

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
		h m s	° ' " "		"	"	h m
Oct.	1	4 00 37.02 ^s +29.99	+18 53 22.9 +192.5	0.591 564 -4511	7.91	14.88	3 23.3
	2	4 01 07.01 26.64	18 56 35.4 185.5	0.587 053 4455	7.97	14.99	3 19.8
	3	4 01 33.65 23.23	18 59 40.9 178.5	0.582 598 4395	8.03	15.10	3 16.3
	4	4 01 56.88 19.75	19 02 39.4 171.3	0.578 203 4334	8.09	15.22	3 12.8
	5	4 02 16.63 16.22	19 05 30.7 164.2	0.573 869 4270	8.16	15.33	3 09.1
	6	4 02 32.85 +12.65	+19 08 14.9 +157.1	0.569 599 -4202	8.22	15.45	3 05.5
	7	4 02 45.50 9.01	19 10 52.0 150.0	0.565 397 4131	8.28	15.56	3 01.7
	8	4 02 54.51 5.32	19 13 22.0 142.6	0.561 266 4057	8.34	15.68	2 58.0
	9	4 02 59.83 + 1.61	19 15 44.6 135.5	0.557 209 3980	8.40	15.79	2 54.1
	10	4 03 01.44 - 2.15	19 18 00.1 128.0	0.553 229 3898	8.46	15.91	2 50.2
	11	4 02 59.29 - 5.92	+19 20 08.1 +120.7	0.549 331 -3812	8.52	16.02	2 46.2
	12	4 02 53.37 9.73	19 22 08.8 113.2	0.545 519 3725	8.58	16.13	2 42.2
	13	4 02 43.64 13.53	19 24 02.0 105.7	0.541 794 3631	8.64	16.24	2 38.1
	14	4 02 30.11 17.34	19 25 47.7 98.0	0.538 163 3535	8.70	16.35	2 33.9
	15	4 02 12.77 21.14	19 27 25.7 90.4	0.534 628 3435	8.75	16.46	2 29.7
	16	4 01 51.63 -24.92	+19 28 56.1 + 82.7	0.531 193 -3332	8.81	16.57	2 25.4
	17	4 01 26.71 28.69	19 30 18.8 74.8	0.527 861 3224	8.87	16.67	2 21.1
	18	4 00 58.02 32.42	19 31 33.6 67.0	0.524 637 3114	8.92	16.77	2 16.6
	19	4 00 25.60 36.12	19 32 40.6 59.0	0.521 523 2999	8.97	16.87	2 12.2
	20	3 59 49.48 39.78	19 33 39.6 51.0	0.518 524 2882	9.03	16.97	2 07.6
	21	3 59 09.70 -43.40	+19 34 30.6 + 42.8	0.515 642 -2761	9.08	17.07	2 03.0
	22	3 58 26.30 46.96	19 35 13.4 34.6	0.512 881 2637	9.12	17.16	1 58.4
	23	3 57 39.34 50.45	19 35 48.0 26.4	0.510 244 2510	9.17	17.25	1 53.7
	24	3 56 48.89 53.90	19 36 14.4 18.1	0.507 734 2378	9.22	17.33	1 48.9
	25	3 55 54.99 57.25	19 36 32.5 9.6	0.505 356 2244	9.26	17.41	1 44.1
	26	3 54 57.74 -60.52	+19 36 42.1 + 1.1	0.503 112 -2106	9.30	17.49	1 39.2
	27	3 53 57.22 63.71	19 36 43.2 - 7.3	0.501 006 1964	9.34	17.56	1 34.2
	28	3 52 53.51 66.77	19 36 35.9 15.9	0.499 042 1819	9.38	17.63	1 29.2
	29	3 51 46.74 69.73	19 36 20.0 24.4	0.497 223 1672	9.41	17.70	1 24.2
	30	3 50 37.01 72.58	19 35 55.6 33.0	0.495 551 1519	9.44	17.76	1 19.1
	31	3 49 24.43 -75.29	+19 35 22.6 - 41.5	0.494 032 -1365	9.47	17.81	1 14.0
Nov.	1	3 48 09.14 77.85	19 34 41.1 50.0	0.492 667 1205	9.50	17.86	1 08.8
	2	3 46 51.29 80.27	19 33 51.1 58.3	0.491 462 1045	9.52	17.91	1 03.6
	3	3 45 31.02 82.52	19 32 52.8 66.5	0.490 417 879	9.54	17.94	0 58.3
	4	3 44 08.50 84.61	19 31 46.3 74.7	0.489 538 711	9.56	17.98	0 53.0
	5	3 42 43.89 -86.51	+19 30 31.6 - 82.5	0.488 827 - 540	9.57	18.00	0 47.7
	6	3 41 17.38 88.21	19 29 09.1 90.3	0.488 287 366	9.58	18.02	0 42.3
	7	3 39 49.17 89.73	19 27 38.8 97.7	0.487 921 189	9.59	18.04	0 36.9
	8	3 38 19.44 91.03	19 26 01.1 104.8	0.487 732 - 9	9.60	18.04	0 31.5
	9	3 36 48.41 92.09	19 24 16.3 111.5	0.487 723 + 172	9.60	18.04	0 26.1
	10	3 35 16.32 -92.95	+19 22 24.8 -117.8	0.487 895 + 357	9.59	18.04	0 20.6
	11	3 33 43.37 93.56	19 20 27.0 123.7	0.488 252 542	9.59	18.02	0 15.1
	12	3 32 09.81 93.94	19 18 23.3 128.9	0.488 794 730	9.57	18.00	0 09.7
	13	3 30 35.87 94.09	19 16 14.4 133.8	0.489 524 917	9.56	17.98	{ 0 04.2 23 58.7
	14	3 29 01.78 93.99	19 14 00.6 138.0	0.490 441 1107	9.54	17.94	23 53.2
	15	3 27 27.79 -93.69	+19 11 42.6 -141.6	0.491 548 +1295	9.52	17.90	23 47.7
	16	3 25 54.10	+19 09 21.0	0.492 843	9.50	17.86	23 42.2

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"			"	"	h m
Nov. 16	3	25	54.10	-93.14	+19	09	21.0	-144.5	0.492 843	+1485	9.50	17.86	23 42.2
17	3	24	20.96	92.39	19	06	56.5	146.9	0.494 328	1673	9.47	17.80	23 36.8
18	3	22	48.57	91.42	19	04	29.6	148.6	0.496 001	1862	9.44	17.74	23 31.3
19	3	21	17.15	90.26	19	02	01.0	149.6	0.497 863	2050	9.40	17.68	23 25.9
20	3	19	46.89	88.91	18	59	31.4	150.0	0.499 913	2237	9.36	17.60	23 20.5
21	3	18	17.98	-87.36	+18	57	01.4	-149.6	0.502 150	+2423	9.32	17.52	23 15.1
22	3	16	50.62	85.65	18	54	31.8	148.8	0.504 573	2607	9.28	17.44	23 09.8
23	3	15	24.97	83.76	18	52	03.0	147.1	0.507 180	2792	9.23	17.35	23 04.4
24	3	14	01.21	81.72	18	49	35.9	144.8	0.509 972	2974	9.18	17.26	22 59.2
25	3	12	39.49	79.53	18	47	11.1	141.9	0.512 946	3154	9.12	17.16	22 53.9
26	3	11	19.96	-77.20	+18	44	49.2	-138.3	0.516 100	+3334	9.07	17.05	22 48.7
27	3	10	02.76	74.74	18	42	30.9	134.2	0.519 434	3511	9.01	16.94	22 43.5
28	3	08	48.02	72.16	18	40	16.7	129.4	0.522 945	3686	8.95	16.83	22 38.4
29	3	07	35.86	69.47	18	38	07.3	124.1	0.526 631	3861	8.89	16.71	22 33.3
30	3	06	26.39	66.68	18	36	03.2	118.3	0.530 492	4031	8.82	16.59	22 28.3
Dec. 1	3	05	19.71	-63.79	+18	34	04.9	-111.9	0.534 523	+4202	8.76	16.46	22 23.3
2	3	04	15.92	60.82	18	32	13.0	105.0	0.538 725	4369	8.69	16.33	22 18.3
3	3	03	15.10	57.76	18	30	28.0	97.6	0.543 094	4534	8.62	16.20	22 13.4
4	3	02	17.34	54.63	18	28	50.4	89.8	0.547 628	4698	8.55	16.07	22 08.6
5	3	01	22.71	51.45	18	27	20.6	81.6	0.552 326	4858	8.47	15.93	22 03.8
6	3	00	31.26	-48.20	+18	25	59.0	-73.0	0.557 184	+5017	8.40	15.79	21 59.1
7	2	59	43.06	44.88	18	24	46.0	64.0	0.562 201	5172	8.32	15.65	21 54.4
8	2	58	58.18	41.54	18	23	42.0	54.6	0.567 373	5326	8.25	15.51	21 49.8
9	2	58	16.64	38.15	18	22	47.4	44.9	0.572 699	5476	8.17	15.37	21 45.2
10	2	57	38.49	34.74	18	22	02.5	34.9	0.578 175	5622	8.09	15.22	21 40.7
11	2	57	03.75	-31.29	+18	21	27.6	-24.8	0.583 797	+5767	8.02	15.07	21 36.2
12	2	56	32.46	27.84	18	21	02.8	14.3	0.589 564	5907	7.94	14.93	21 31.8
13	2	56	04.62	24.40	18	20	48.5	-3.8	0.595 471	6044	7.86	14.78	21 27.5
14	2	55	40.22	20.94	18	20	44.7	+7.0	0.601 515	6178	7.78	14.63	21 23.2
15	2	55	19.28	17.51	18	20	51.7	17.7	0.607 693	6308	7.70	14.48	21 19.0
16	2	55	01.77	-14.10	+18	21	09.4	+28.6	0.614 001	+6435	7.62	14.33	21 14.8
17	2	54	47.67	10.71	18	21	38.0	39.5	0.620 436	6558	7.54	14.18	21 10.7
18	2	54	36.96	7.36	18	22	17.5	50.3	0.626 994	6679	7.46	14.04	21 06.6
19	2	54	29.60	4.03	18	23	07.8	61.2	0.633 673	6796	7.39	13.89	21 02.6
20	2	54	25.57	-0.76	18	24	09.0	71.9	0.640 469	6910	7.31	13.74	20 58.7
21	2	54	24.81	+2.48	+18	25	20.9	+82.6	0.647 379	+7022	7.23	13.59	20 54.8
22	2	54	27.29	5.67	18	26	43.5	93.1	0.654 401	7130	7.15	13.45	20 50.9
23	2	54	32.96	8.82	18	28	16.6	103.5	0.661 531	7235	7.07	13.30	20 47.1
24	2	54	41.78	11.91	18	30	00.1	113.9	0.668 766	7338	7.00	13.16	20 43.4
25	2	54	53.69	14.96	18	31	54.0	123.9	0.676 104	7439	6.92	13.02	20 39.7
26	2	55	08.65	+17.96	+18	33	57.9	+133.8	0.683 543	+7536	6.85	12.87	20 36.1
27	2	55	26.61	20.91	18	36	11.7	143.6	0.691 079	7632	6.77	12.73	20 32.5
28	2	55	47.52	23.80	18	38	35.3	153.1	0.698 711	7725	6.70	12.59	20 28.9
29	2	56	11.32	26.65	18	41	08.4	162.4	0.706 436	7815	6.62	12.46	20 25.4
30	2	56	37.97	29.44	18	43	50.8	171.4	0.714 251	7905	6.55	12.32	20 22.0
31	2	57	07.41	+32.19	+18	46	42.2	+180.4	0.722 156	+7991	6.48	12.19	20 18.6
32	2	57	39.60		+18	49	42.6		0 730 147		6.41	12.05	20 15.2

MARS, 1958
FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	' "	"	° ' "	"		
Jan.	- 1	224 37 59.7	29 46.5	-08.6	+0 08 54.2	-57.5	0.193 6780	-3398
	1	225 37 38.3	29 52.2	06.7	0 06 58.9	57.8	0.192 9957	3425
	3	226 37 28.3	29 57.8	04.8	0 05 03.2	58.0	0.192 3081	3451
	5	227 37 29.7	30 03.6	03.0	0 03 06.9	58.2	0.191 6154	3476
	7	228 37 42.7	30 09.4	-01.1	+0 01 10.2	58.4	0.190 9177	3501
	9	229 38 07.3	30 15.2	+00.8	-0 00 46.8	-58.6	0.190 2151	-3524
	11	230 38 43.7	30 21.2	02.7	0 02 44.3	58.8	0.189 5080	3547
	13	231 39 32.0	30 27.1	04.5	0 04 42.0	59.0	0.188 7964	3569
	15	232 40 32.3	30 33.2	06.4	0 06 40.1	59.1	0.188 0805	3590
	17	233 41 44.7	30 39.3	08.3	0 08 38.4	59.2	0.187 3606	3609
	19	234 43 09.4	30 45.4	+10.2	-0 10 37.0	-59.3	0.186 6368	-3628
	21	235 44 46.4	30 51.6	12.1	0 12 35.7	59.4	0.185 9094	3646
	23	236 46 35.8	30 57.9	14.0	0 14 34.6	59.5	0.185 1786	3662
	25	237 48 37.8	31 04.2	15.8	0 16 33.6	59.5	0.184 4445	3678
	27	238 50 52.5	31 10.5	17.7	0 18 32.7	59.6	0.183 7075	3692
	29	239 53 19.9	31 16.9	+19.5	-0 20 31.9	-59.6	0.182 9676	-3706
	31	240 56 00.1	31 23.3	21.4	0 22 31.0	59.6	0.182 2252	3718
Feb.	2	241 58 53.3	31 29.8	23.2	0 24 30.1	59.5	0.181 4805	3729
	4	243 01 59.4	31 36.3	25.0	0 26 29.1	59.5	0.180 7337	3739
	6	244 05 18.7	31 42.9	26.7	0 28 28.0	59.4	0.179 9851	3747
	8	245 08 51.1	31 49.5	+28.4	-0 30 26.7	-59.3	0.179 2349	-3755
	10	246 12 36.8	31 56.2	30.1	0 32 25.2	59.2	0.178 4833	3761
	12	247 16 35.7	32 02.8	31.7	0 34 23.4	59.0	0.177 7307	3766
	14	248 20 48.1	32 09.5	33.3	0 36 21.4	58.9	0.176 9772	3769
	16	249 25 13.9	32 16.3	34.8	0 38 19.0	58.7	0.176 2231	3771
	18	250 29 53.2	32 23.0	+36.3	-0 40 16.1	-58.5	0.175 4688	-3772
	20	251 34 46.0	32 29.8	37.8	0 42 12.8	58.2	0.174 7144	3772
	22	252 39 52.4	32 36.6	39.2	0 44 09.0	58.0	0.173 9602	3770
	24	253 45 12.5	32 43.5	40.6	0 46 04.7	57.7	0.173 2066	3766
	26	254 50 46.3	32 50.3	41.9	0 47 59.8	57.4	0.172 4538	3761
	28	255 56 33.7	32 57.2	+43.2	-0 49 54.2	-57.0	0.171 7022	-3755
	2	257 02 34.9	33 04.0	44.4	0 51 47.9	56.7	0.170 9519	3747
	4	258 08 49.9	33 10.9	45.5	0 53 40.8	56.3	0.170 2033	3738
Mar.	6	259 15 18.6	33 17.8	46.6	0 55 33.0	55.9	0.169 4566	3729
	8	260 22 01.1	33 24.7	47.6	0 57 24.2	55.4	0.168 7123	3715
	10	261 28 57.4	33 31.6	+48.5	-0 59 14.6	-54.9	0.167 9706	-3702
	12	262 36 07.5	33 38.5	49.4	1 01 03.9	54.4	0.167 2318	3686
	14	263 43 31.4	33 45.4	50.2	1 02 52.3	53.9	0.166 4962	3669
	16	264 51 09.0	33 52.3	51.0	1 04 39.5	53.3	0.165 7642	3651
	18	265 59 00.4	33 59.1	51.6	1 06 25.6	52.8	0.165 0360	3631
	20	267 07 05.5	34 06.0	+52.2	-1 08 10.5	-52.1	0.164 3120	-3609
	22	268 15 24.3	34 12.8	52.7	1 09 54.1	51.5	0.163 5926	3585
	24	269 23 56.7	34 19.6	53.1	1 11 36.4	50.8	0.162 8779	3560
	26	270 32 42.7	34 26.4	53.4	1 13 17.4	50.1	0.162 1685	3534
	28	271 41 42.2	34 33.1	53.6	1 14 56.9	49.4	0.161 4646	3505
	30	272 50 55.2	34 39.9	+53.7	-1 16 34.9	-48.6	0.160 7665	-3475
	1	274 00 21.6	34 46.5	+53.8	-1 18 11.3	-47.8	0.160 0746	-3443
Apr.	1							

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	" "	"	° ' "	"		
Apr.	1	274 00 21.6	34 46.5	+53.8	-1 18 11.3	-47.8	0.160 0746	-3443
	3	275 10 01.4	34 53.2	53.7	1 19 46.1	47.0	0.159 3892	3410
	5	276 19 54.3	34 59.8	53.6	1 21 19.2	46.1	0.158 7106	3375
	7	277 30 00.4	35 06.3	53.4	1 22 50.7	45.3	0.158 0393	3338
	9	278 40 19.6	35 12.8	53.1	1 24 20.3	44.3	0.157 3755	3300
	11	279 50 51.7	35 19.3	+52.7	-1 25 48.0	-43.4	0.156 7196	-3259
	13	281 01 36.6	35 25.6	52.2	1 27 13.9	42.4	0.156 0719	3217
	15	282 12 34.1	35 31.9	51.7	1 28 37.8	41.4	0.155 4328	3174
	17	283 23 44.3	35 38.2	51.0	1 29 59.6	40.4	0.154 8025	3128
	19	284 35 06.8	35 44.3	50.3	1 31 19.4	39.3	0.154 1815	3081
	21	285 46 41.6	35 50.4	+49.4	-1 32 37.0	-38.3	0.153 5701	-3033
	23	286 58 28.5	35 56.4	48.5	1 33 52.4	37.1	0.152 9686	2982
	25	288 10 27.3	36 02.4	47.5	1 35 05.6	36.0	0.152 3773	2930
	27	289 22 37.9	36 08.2	46.4	1 36 16.4	34.8	0.151 7966	2876
	29	290 35 00.0	36 13.9	45.2	1 37 24.9	33.6	0.151 2269	2821
May	1	291 47 33.5	36 19.6	+44.0	-1 38 30.9	-32.4	0.150 6683	-2764
	3	293 00 18.2	36 25.1	42.6	1 39 34.5	31.2	0.150 1214	2705
	5	294 13 13.9	36 30.5	41.2	1 40 35.6	29.9	0.149 5863	2645
	7	295 26 20.3	36 35.8	39.7	1 41 34.1	28.6	0.149 0635	2583
	9	296 39 37.2	36 41.0	38.1	1 42 30.0	27.3	0.148 5532	2520
	11	297 53 04.3	36 46.1	+36.5	-1 43 23.2	-25.9	0.148 0557	-2455
	13	299 06 41.6	36 51.1	34.8	1 44 13.6	24.5	0.147 5713	2389
	15	300 20 28.6	36 55.9	33.0	1 45 01.3	23.2	0.147 1003	2321
	17	301 34 25.2	37 00.6	31.1	1 45 46.2	21.7	0.146 6431	2251
	19	302 48 31.0	37 05.2	29.2	1 46 28.3	20.3	0.146 1999	2181
	21	304 02 45.8	37 09.6	+27.2	-1 47 07.4	-18.8	0.145 7710	-2108
	23	305 17 09.3	37 13.9	25.1	1 47 43.7	17.4	0.145 3566	2035
	25	306 31 41.3	37 18.0	23.0	1 48 16.9	15.9	0.144 9570	1960
	27	307 46 21.4	37 22.0	20.9	1 48 47.2	14.4	0.144 5726	1884
	29	309 01 09.3	37 25.9	18.7	1 49 14.4	12.9	0.144 2034	1807
	31	310 16 04.7	37 29.5	+16.5	-1 49 38.6	-11.3	0.143 8499	-1729
June	2	311 31 07.3	37 33.0	14.3	1 49 59.7	09.8	0.143 5121	1649
	4	312 46 16.8	37 36.4	12.0	1 50 17.7	08.2	0.143 1904	1568
	6	314 01 32.8	37 39.6	09.7	1 50 32.5	06.6	0.142 8849	1487
	8	315 16 55.0	37 42.6	07.4	1 50 44.2	05.0	0.142 5958	1404
	10	316 32 23.1	37 45.5	+05.1	-1 50 52.6	-03.4	0.142 3234	-1320
	12	317 47 56.7	37 48.1	02.7	1 50 57.9	01.8	0.142 0678	1236
	14	319 03 35.5	37 50.6	+00.4	1 51 00.0	-00.2	0.141 8292	1150
	16	320 19 19.1	37 52.9	-02.0	1 50 58.8	+01.4	0.141 6078	1064
	18	321 35 07.1	37 55.1	04.4	1 50 54.4	03.0	0.141 4037	977
	20	322 50 59.2	37 57.0	-06.8	-1 50 46.8	+04.6	0.141 2170	-889
	22	324 06 55.1	37 58.8	09.1	1 50 35.9	06.3	0.141 0480	801
	24	325 22 54.3	38 00.4	11.5	1 50 21.8	07.9	0.140 8966	712
	26	326 38 56.4	38 01.8	13.8	1 50 04.4	09.5	0.140 7630	623
	28	327 55 01.2	38 03.0	16.1	1 49 43.8	11.1	0.140 6474	533
	30	329 11 08.1	38 04.0	-18.3	-1 49 19.9	+12.7	0.140 5497	-443
	2	330 27 16.9	38 04.8	-20.5	-1 48 52.9	+14.3	0.140 4700	-353
July								

MARS, 1958
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Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	' "	"	° ' "	"		
July	2	330 27 16.9	38 04.8	-20.5	-1 48 52.9	+14.3	0.140 4700	- 353
	4	331 43 27.2	38 05.4	22.7	1 48 22.6	15.9	0.140 4085	262
	6	332 59 38.5	38 05.9	24.8	1 47 49.1	17.5	0.140 3651	172
	8	334 15 50.5	38 06.1	26.9	1 47 12.4	19.1	0.140 3398	- 81
	10	335 32 02.7	38 06.1	28.9	1 46 32.6	20.7	0.140 3328	+ 10
	12	336 48 14.9	38 06.0	-30.9	-1 45 49.6	+22.3	0.140 3440	+ 101
	14	338 04 26.6	38 05.7	32.8	1 45 03.6	23.8	0.140 3734	192
	16	339 20 37.4	38 05.1	34.7	1 44 14.4	25.3	0.140 4209	283
	18	340 36 46.9	38 04.4	36.5	1 43 22.2	26.9	0.140 4866	374
	20	341 52 54.8	38 03.5	38.2	1 42 26.9	28.4	0.140 5703	464
	22	343 09 00.7	38 02.4	-39.9	-1 41 28.7	+29.9	0.140 6721	+ 554
	24	344 25 04.2	38 01.1	41.4	1 40 27.5	31.3	0.140 7919	644
	26	345 41 04.9	37 59.6	42.9	1 39 23.5	32.8	0.140 9295	733
	28	346 57 02.5	37 57.9	44.3	1 38 16.5	34.2	0.141 0850	821
	30	348 12 56.5	37 56.1	45.6	1 37 06.7	35.6	0.141 2581	910
Aug.	1	349 28 46.6	37 54.0	-46.8	-1 35 54.2	+37.0	0.141 4488	+ 997
	3	350 44 32.4	37 51.8	47.9	1 34 38.9	38.3	0.141 6568	1084
	5	352 00 13.6	37 49.4	48.9	1 33 20.9	39.6	0.141 8822	1170
	7	353 15 49.8	37 46.8	49.8	1 32 00.3	40.9	0.142 1248	1255
	9	354 31 20.7	37 44.1	50.7	1 30 37.2	42.2	0.142 3843	1340
	11	355 46 45.9	37 41.1	-51.4	-1 29 11.5	+43.5	0.142 6606	+1423
	13	357 02 05.1	37 38.0	52.1	1 27 43.4	44.7	0.142 9534	1506
	15	358 17 17.9	37 34.8	52.6	1 26 12.9	45.9	0.143 2628	1587
	17	359 32 24.1	37 31.3	53.0	1 24 40.0	47.0	0.143 5883	1668
	19	0 47 23.2	37 27.7	53.4	1 23 04.9	48.1	0.143 9297	1747
	21	2 02 15.0	37 24.0	-53.6	-1 21 27.5	+49.2	0.144 2870	+1825
	23	3 16 59.1	37 20.1	53.8	1 19 48.0	50.3	0.144 6598	1902
	25	4 31 35.3	37 16.1	53.8	1 18 06.5	51.3	0.145 0478	1978
	27	5 46 03.2	37 11.9	53.7	1 16 22.9	52.3	0.145 4509	2053
	29	7 00 22.6	37 07.5	53.5	1 14 37.3	53.2	0.145 8688	2126
	31	8 14 33.2	37 03.0	-53.3	-1 12 49.9	+54.2	0.146 3012	+2198
Sept.	2	9 28 34.7	36 58.4	52.9	1 11 00.7	55.1	0.146 7478	2268
	4	10 42 26.8	36 53.7	52.4	1 09 09.7	55.9	0.147 2084	2337
	6	11 56 09.3	36 48.8	51.8	1 07 17.1	56.7	0.147 6826	2405
	8	13 09 41.9	36 43.8	51.2	1 05 22.8	57.5	0.148 1702	2471
	10	14 23 04.4	36 38.7	-50.5	-1 03 27.0	+58.3	0.148 6709	+2536
	12	15 36 16.5	36 33.4	49.6	1 01 29.8	59.0	0.149 1844	2599
	14	16 49 18.1	36 28.1	48.7	0 59 31.2	59.6	0.149 7103	2660
	16	18 02 08.8	36 22.6	47.7	0 57 31.3	60.3	0.150 2483	2720
	18	19 14 48.5	36 17.1	46.6	0 55 30.1	60.9	0.150 7982	2778
	20	20 27 17.0	36 11.4	-45.4	-0 53 27.8	+61.4	0.151 3596	+2835
	22	21 39 34.1	36 05.6	44.1	0 51 24.3	62.0	0.151 9322	2890
	24	22 51 39.6	35 59.8	42.8	0 49 19.9	62.5	0.152 5156	2944
	26	24 03 33.3	35 53.9	41.4	0 47 14.5	62.9	0.153 1095	2995
	28	25 15 15.0	35 47.8	39.9	0 45 08.1	63.4	0.153 7136	3045
	30	26 26 44.6	35 41.8	-38.4	-0 43 01.0	+63.8	0.154 3276	+3094
Oct.	2	27 38 02.0	35 35.6	-36.8	-0 40 53.1	+64.1	0.154 9511	+3141

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	' "	"	° ' "	"		
Oct.	2	27 38 02.0	35 35.6	-36.8	-0 40 53.1	+64.1	0.154 9511	+3141
	4	28 49 06.9	35 29.3	35.2	0 38 44.5	64.4	0.155 5837	3186
	6	29 59 59.3	35 23.0	33.5	0 36 35.3	64.7	0.156 2252	3229
	8	31 10 38.9	35 16.7	31.7	0 34 25.6	65.0	0.156 8751	3270
	10	32 21 05.8	35 10.2	29.9	0 32 15.4	65.2	0.157 5332	3310
	12	33 31 19.8	35 03.7	-28.1	-0 30 04.8	+65.4	0.158 1992	+3349
	14	34 41 20.8	34 57.2	26.2	0 27 53.8	65.6	0.158 8726	3385
	16	35 51 08.6	34 50.6	24.3	0 25 42.5	65.7	0.159 5531	3420
	18	37 00 43.2	34 44.0	22.3	0 23 31.1	65.8	0.160 2403	3453
	20	38 10 04.5	34 37.3	20.3	0 21 19.5	65.8	0.160 9341	3484
	22	39 19 12.5	34 30.6	-18.2	-0 19 07.7	+65.9	0.161 6339	+3514
	24	40 28 07.0	34 23.9	16.2	0 16 56.0	65.9	0.162 3395	3542
	26	41 36 48.0	34 17.1	14.1	0 14 44.2	65.9	0.163 0506	3568
	28	42 45 15.5	34 10.4	12.1	0 12 32.6	65.8	0.163 7667	3593
	30	43 53 29.4	34 03.5	10.0	0 10 21.0	65.7	0.164 4876	3616
Nov.	1	45 01 29.7	33 56.7	-07.9	-0 08 09.7	+65.6	0.165 2130	+3637
	3	46 09 16.3	33 49.9	05.8	0 05 58.6	65.5	0.165 9425	3657
	5	47 16 49.3	33 43.0	03.7	0 03 47.9	65.3	0.166 6758	3675
	7	48 24 08.5	33 36.2	-01.6	-0 01 37.4	65.1	0.167 4125	3692
	9	49 31 14.1	33 29.3	+00.5	+0 00 32.6	64.9	0.168 1524	3707
	11	50 38 05.9	33 22.5	+02.6	+0 02 42.1	+64.7	0.168 8952	+3720
	13	51 44 44.0	33 15.6	04.7	0 04 51.2	64.4	0.169 6404	3732
	15	52 51 08.4	33 08.8	06.8	0 06 59.7	64.1	0.170 3879	3743
	17	53 57 19.1	33 01.9	08.8	0 09 07.6	63.8	0.171 1374	3751
	19	55 03 16.1	32 55.1	10.8	0 11 14.9	63.5	0.171 8884	3759
	21	56 08 59.4	32 48.3	+12.8	+0 13 21.5	+63.1	0.172 6408	+3765
	23	57 14 29.1	32 41.5	14.8	0 15 27.3	62.7	0.173 3942	3769
	25	58 19 45.3	32 34.7	16.8	0 17 32.4	62.3	0.174 1483	3772
	27	59 24 47.8	32 27.9	18.7	0 19 36.6	61.9	0.174 9029	3774
	29	60 29 36.9	32 21.2	20.6	0 21 40.1	61.5	0.175 6577	3774
Dec.	1	61 34 12.5	32 14.4	+22.5	+0 23 42.6	+61.0	0.176 4123	+3773
	3	62 38 34.7	32 07.7	24.3	0 25 44.2	60.6	0.177 1667	3770
	5	63 42 43.5	32 01.1	26.1	0 27 44.8	60.1	0.177 9203	3766
	7	64 46 39.0	31 54.5	27.8	0 29 44.5	59.6	0.178 6731	3761
	9	65 50 21.3	31 47.9	29.5	0 31 43.1	59.0	0.179 4247	3755
	11	66 53 50.5	31 41.3	+31.1	+0 33 40.7	+58.5	0.180 1749	+3747
	13	67 57 06.6	31 34.8	32.7	0 35 37.2	58.0	0.180 9235	3738
	15	69 00 09.6	31 28.3	34.2	0 37 32.5	57.4	0.181 6701	3728
	17	70 02 59.8	31 21.9	35.7	0 39 26.7	56.8	0.182 4146	3717
	19	71 05 37.1	31 15.5	37.2	0 41 19.7	56.2	0.183 1567	3704
	21	72 08 01.7	31 09.1	+38.6	+0 43 11.6	+55.6	0.183 8962	+3691
	23	73 10 13.6	31 02.8	39.9	0 45 02.2	55.0	0.184 6329	3676
	25	74 12 12.9	30 56.6	41.2	0 46 51.5	54.3	0.185 3665	3660
	27	75 13 59.8	30 50.3	42.4	0 48 39.5	53.7	0.186 0968	3643
	29	76 15 34.3	30 44.2	43.6	0 50 26.3	53.1	0.186 8237	3625
	31	77 16 56.6	30 38.1	+44.7	+0 52 11.7	+52.4	0.187 5468	+3606
	33	78 18 06.7	30 32.0	+45.7	+0 53 55.8	+51.7	0.188 2660	+3586

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"				h	m
Jan.	0	13 47	32.75	+29.51	- 9 46	22.4	-153.7	5.702 448	-15350	16.12	1.54	7 09.9
	1	13 48	02.26	29.02	9 48	56.1	150.5	5.687 098	15426	16.16	1.55	7 06.5
	2	13 48	31.28	28.52	9 51	26.6	147.4	5.671 672	15501	16.20	1.55	7 03.0
	3	13 48	59.80	28.01	9 53	54.0	144.3	5.656 171	15572	16.25	1.56	6 59.5
	4	13 49	27.81	27.49	9 56	18.3	141.1	5.640 599	15638	16.29	1.56	6 56.1
	5	13 49	55.30	+26.98	- 9 58	39.4	-137.8	5.624 961	-15703	16.34	1.56	6 52.6
	6	13 50	22.28	26.45	10 00	57.2	134.6	5.609 258	15764	16.38	1.57	6 49.1
	7	13 50	48.73	25.92	10 03	11.8	131.4	5.593 494	15820	16.43	1.57	6 45.6
	8	13 51	14.65	25.37	10 05	23.2	128.1	5.577 674	15876	16.48	1.58	6 42.1
	9	13 51	40.02	24.84	10 07	31.3	124.8	5.561 798	15926	16.53	1.58	6 38.6
	10	13 52	04.86	+24.27	-10 09	36.1	-121.3	5.545 872	-15972	16.57	1.59	6 35.1
	11	13 52	29.13	23.71	10 11	37.4	118.1	5.529 900	16017	16.62	1.59	6 31.5
	12	13 52	52.84	23.15	10 13	35.5	114.6	5.513 883	16056	16.67	1.60	6 28.0
	13	13 53	15.99	22.56	10 15	30.1	111.2	5.497 827	16092	16.72	1.60	6 24.4
14	13 53	38.55	21.98	10 17	21.3	107.7	5.481 735	16124	16.77	1.61	6 20.9	
15	13 54	00.53	+21.38	-10 19	09.0	-104.3	5.465 611	-16152	16.82	1.61	6 17.3	
16	13 54	21.91	20.79	10 20	53.3	100.7	5.449 459	16175	16.87	1.61	6 13.7	
17	13 54	42.70	20.17	10 22	34.0	97.2	5.433 284	16193	16.92	1.62	6 10.1	
18	13 55	02.87	19.56	10 24	11.2	93.6	5.417 091	16209	16.97	1.62	6 06.5	
19	13 55	22.43	18.93	10 25	44.8	90.0	5.400 882	16219	17.02	1.63	6 02.9	
20	13 55	41.36	+18.31	-10 27	14.8	- 86.4	5.384 663	-16224	17.07	1.63	5 59.3	
21	13 55	59.67	17.68	10 28	41.2	82.8	5.368 439	16224	17.12	1.64	5 55.7	
22	13 56	17.35	17.03	10 30	04.0	79.1	5.352 215	16221	17.17	1.64	5 52.0	
23	13 56	34.38	16.39	10 31	23.1	75.5	5.335 994	16212	17.22	1.65	5 48.4	
24	13 56	50.77	15.73	10 32	38.6	71.8	5.319 782	16199	17.28	1.65	5 44.7	
25	13 57	06.50	+15.08	-10 33	50.4	- 68.1	5.303 583	-16183	17.33	1.66	5 41.1	
26	13 57	21.58	14.43	10 34	58.5	64.3	5.287 400	16160	17.38	1.66	5 37.4	
27	13 57	36.01	13.75	10 36	02.8	60.7	5.271 240	16132	17.44	1.67	5 33.7	
28	13 57	49.76	13.09	10 37	03.5	56.9	5.255 108	16103	17.49	1.67	5 30.0	
29	13 58	02.85	12.41	10 38	00.4	53.1	5.239 005	16066	17.54	1.68	5 26.2	
30	13 58	15.26	+11.74	-10 38	53.5	- 49.4	5.222 939	-16026	17.60	1.68	5 22.5	
31	13 58	27.00	11.05	10 39	42.9	45.5	5.206 913	15981	17.65	1.69	5 18.8	
Feb.	1	13 58	38.05	10.37	10 40	28.4	41.8	5.190 932	15933	17.71	1.70	5 15.0
	2	13 58	48.42	9.68	10 41	10.2	38.0	5.174 999	15880	17.76	1.70	5 11.3
	3	13 58	58.10	8.99	10 41	48.2	34.2	5.159 119	15821	17.81	1.71	5 07.5
	4	13 59	07.09	+ 8.29	-10 42	22.4	- 30.4	5.143 298	-15762	17.87	1.71	5 03.7
	5	13 59	15.38	7.59	10 42	52.8	26.5	5.127 536	15695	17.92	1.72	4 59.9
	6	13 59	22.97	6.89	10 43	19.3	22.7	5.111 841	15623	17.98	1.72	4 56.1
	7	13 59	29.86	6.18	10 43	42.0	18.9	5.096 218	15551	18.03	1.73	4 52.3
	8	13 59	36.04	5.47	10 44	00.9	15.0	5.080 667	15470	18.09	1.73	4 48.5
	9	13 59	41.51	+ 4.75	-10 44	15.9	- 11.1	5.065 197	-15388	18.14	1.74	4 44.6
	10	13 59	46.26	4.04	10 44	27.0	7.2	5.049 809	15298	18.20	1.74	4 40.8
	11	13 59	50.30	3.31	10 44	34.2	- 3.4	5.034 511	15205	18.26	1.75	4 36.9
	12	13 59	53.61	2.59	10 44	37.6	+ 0.6	5.019 306	15107	18.31	1.75	4 33.0
	13	13 59	56.20	1.87	10 44	37.0	4.4	5.004 199	15004	18.37	1.76	4 29.1
	14	13 59	58.07	+ 1.13	-10 44	32.6	+ 8.4	4.989 195	-14894	18.42	1.76	4 25.2
	15	13 59	59.20		-10 44	24.2		4.974 301		18.48	1.77	4 21.3

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Date	Apparent Right Ascension	Apparent Declination	True Distance from Earth	Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h m s	° ' " "		"	"	h m
Feb. 15	13 59 59.20	-10 44 24.2	4.974 301	18.48	1.77	4 21.3
16	13 59 59.60	10 44 12.0	4.959 519	18.53	1.77	4 17.4
17	13 59 59.28	10 43 55.9	4.944 857	18.59	1.78	4 13.4
18	13 59 58.22	10 43 35.9	4.930 318	18.64	1.78	4 09.5
19	13 59 56.44	10 43 12.0	4.915 910	18.70	1.79	4 05.5
20	13 59 53.92	-10 42 44.2	4.901 635	18.75	1.80	4 01.5
21	13 59 50.68	10 42 12.6	4.887 499	18.80	1.80	3 57.6
22	13 59 46.72	10 41 37.2	4.873 508	18.86	1.81	3 53.6
23	13 59 42.03	10 40 57.9	4.859 665	18.91	1.81	3 49.5
24	13 59 36.62	10 40 14.8	4.845 977	18.97	1.82	3 45.5
25	13 59 30.49	-10 39 28.0	4.832 446	19.02	1.82	3 41.5
26	13 59 23.66	10 38 37.4	4.819 080	19.07	1.83	3 37.4
27	13 59 16.11	10 37 43.1	4.805 882	19.12	1.83	3 33.4
28	13 59 07.86	10 36 45.0	4.792 856	19.18	1.84	3 29.3
Mar. 1	13 58 58.92	10 35 43.3	4.780 006	19.23	1.84	3 25.2
2	13 58 49.27	-10 34 38.0	4.767 338	19.28	1.85	3 21.1
3	13 58 38.95	10 33 29.0	4.754 855	19.33	1.85	3 17.0
4	13 58 27.94	10 32 16.5	4.742 562	19.38	1.86	3 12.9
5	13 58 16.25	10 31 00.4	4.730 462	19.43	1.86	3 08.8
6	13 58 03.89	10 29 40.8	4.718 559	19.48	1.86	3 04.6
7	13 57 50.88	-10 28 17.7	4.706 858	19.53	1.87	3 00.5
8	13 57 37.20	10 26 51.2	4.695 362	19.57	1.87	2 56.3
9	13 57 22.87	10 25 21.2	4.684 076	19.62	1.88	2 52.2
10	13 57 07.90	10 23 48.0	4.673 002	19.67	1.88	2 48.0
11	13 56 52.29	10 22 11.4	4.662 148	19.71	1.89	2 43.8
12	13 56 36.06	-10 20 31.5	4.651 515	19.76	1.89	2 39.6
13	13 56 19.20	10 18 48.4	4.641 109	19.80	1.90	2 35.4
14	13 56 01.74	10 17 02.1	4.630 933	19.85	1.90	2 31.2
15	13 55 43.67	10 15 12.8	4.620 994	19.89	1.90	2 26.9
16	13 55 25.02	10 13 20.3	4.611 293	19.93	1.91	2 22.7
17	13 55 05.79	-10 11 24.9	4.601 836	19.97	1.91	2 18.4
18	13 54 46.00	10 09 26.5	4.592 625	20.01	1.92	2 14.2
19	13 54 25.65	10 07 25.3	4.583 667	20.05	1.92	2 09.9
20	13 54 04.76	10 05 21.3	4.574 963	20.09	1.92	2 05.6
21	13 53 43.35	10 03 14.7	4.566 518	20.13	1.93	2 01.3
22	13 53 21.44	-10 01 05.4	4.558 335	20.16	1.93	1 57.0
23	13 52 59.02	9 58 53.5	4.550 418	20.20	1.93	1 52.7
24	13 52 36.13	9 56 39.2	4.542 769	20.23	1.94	1 48.4
25	13 52 12.78	9 54 22.5	4.535 391	20.27	1.94	1 44.1
26	13 51 48.98	9 52 03.5	4.528 288	20.30	1.94	1 39.8
27	13 51 24.75	- 9 49 42.3	4.521 461	20.33	1.95	1 35.4
28	13 51 00.11	9 47 19.0	4.514 915	20.36	1.95	1 31.1
29	13 50 35.08	9 44 53.7	4.508 649	20.39	1.95	1 26.8
30	13 50 09.66	9 42 26.5	4.502 668	20.41	1.95	1 22.4
31	13 49 43.89	9 39 57.5	4.496 973	20.44	1.96	1 18.0
Apr. 1	13 49 17.78	- 9 37 26.8	4.491 565	20.46	1.96	1 13.7
2	13 48 51.34	- 9 34 54.4	4.486 446	20.49	1.96	1 09.3

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Polar Semi-diameter	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s	°	'	"	"		"	"	h m
Apr.	1	13 49	17.78	-26.44	-9 37	26.8	+152.4	4.491 565	-5119	20.46	1.96	1 13.7
	2	13 48	51.34	26.74	9 34	54.4	153.9	4.486 446	4827	20.49	1.96	1 09.3
	3	13 48	24.60	27.02	9 32	20.5	155.3	4.481 619	4537	20.51	1.96	1 04.9
	4	13 47	57.58	27.31	9 29	45.2	156.7	4.477 082	4241	20.53	1.97	1 00.6
	5	13 47	30.27	27.55	9 27	08.5	157.8	4.472 841	3946	20.55	1.97	0 56.2
	6	13 47	02.72	-27.79	-9 24	30.7	+159.1	4.468 895	-3650	20.57	1.97	0 51.8
	7	13 46	34.93	28.01	9 21	51.6	160.0	4.465 245	3350	20.58	1.97	0 47.4
	8	13 46	06.92	28.21	9 19	11.6	160.9	4.461 895	3052	20.60	1.97	0 43.0
	9	13 45	38.71	28.38	9 16	30.7	161.8	4.458 843	2750	20.61	1.97	0 38.6
	10	13 45	10.33	28.55	9 13	48.9	162.4	4.456 093	2448	20.63	1.97	0 34.2
	11	13 44	41.78	-28.69	-9 11	06.5	+163.1	4.453 645	-2143	20.64	1.98	0 29.8
	12	13 44	13.09	28.80	9 08	23.4	163.5	4.451 502	1838	20.65	1.98	0 25.4
	13	13 43	44.29	28.91	9 05	39.9	163.8	4.449 664	1534	20.66	1.98	0 21.0
	14	13 43	15.38	28.98	9 02	56.1	164.1	4.448 130	1226	20.66	1.98	0 16.6
	15	13 42	46.40	29.04	9 00	12.0	164.2	4.446 904	920	20.67	1.98	0 12.1
	16	13 42	17.36	-29.08	-8 57	27.8	+164.2	4.445 984	-613	20.67	1.98	0 07.7
	17	13 41	48.28	29.09	8 54	43.6	164.1	4.445 371	-306	20.68	1.98	{ 0 03.3 23 58.9
	18	13 41	19.19	29.09	8 51	59.5	163.8	4.445 065	+ 1	20.68	1.98	23 54.5
	19	13 40	50.10	29.06	8 49	15.7	163.5	4.445 066	307	20.68	1.98	23 50.1
	20	13 40	21.04	29.01	8 46	32.2	162.9	4.445 373	614	20.68	1.98	23 45.7
	21	13 39	52.03	-28.94	-8 43	49.3	+162.4	4.445 987	+ 920	20.67	1.98	23 41.3
	22	13 39	23.09	28.84	8 41	06.9	161.6	4.446 907	1224	20.67	1.98	23 36.8
	23	13 38	54.25	28.74	8 38	25.3	160.8	4.448 131	1529	20.66	1.98	23 32.4
	24	13 38	25.51	28.60	8 35	44.5	159.8	4.449 660	1830	20.66	1.98	23 28.0
	25	13 37	56.91	28.45	8 33	04.7	158.7	4.451 490	2131	20.65	1.98	23 23.6
	26	13 37	28.46	-28.28	-8 30	26.0	+157.6	4.453 621	+2431	20.64	1.98	23 19.2
	27	13 37	00.18	28.09	8 27	48.4	156.2	4.456 052	2727	20.63	1.97	23 14.8
	28	13 36	32.09	27.87	8 25	12.2	154.9	4.458 779	3024	20.61	1.97	23 10.4
	29	13 36	04.22	27.65	8 22	37.3	153.2	4.461 803	3317	20.60	1.97	23 06.1
	30	13 35	36.57	27.40	8 20	04.1	151.7	4.465 120	3608	20.58	1.97	23 01.7
May	1	13 35	09.17	-27.14	-8 17	32.4	+150.0	4.468 728	+3898	20.57	1.97	22 57.3
	2	13 34	42.03	26.86	8 15	02.4	148.1	4.472 626	4184	20.55	1.97	22 52.9
	3	13 34	15.17	26.57	8 12	34.3	146.3	4.476 810	4470	20.53	1.97	22 48.5
	4	13 33	48.60	26.25	8 10	08.0	144.1	4.481 280	4753	20.51	1.96	22 44.2
	5	13 33	22.35	25.93	8 07	43.9	142.1	4.486 033	5034	20.49	1.96	22 39.8
	6	13 32	56.42	-25.58	-8 05	21.8	+139.9	4.491 067	+5312	20.46	1.96	22 35.4
	7	13 32	30.84	25.23	8 03	01.9	137.6	4.496 379	5589	20.44	1.96	22 31.1
	8	13 32	05.61	24.85	8 00	44.3	135.2	4.501 968	5863	20.42	1.95	22 26.8
	9	13 31	40.76	24.46	7 58	29.1	132.7	4.507 831	6135	20.39	1.95	22 22.4
	10	13 31	16.30	24.05	7 56	16.4	130.1	4.513 966	6405	20.36	1.95	22 18.1
	11	13 30	52.25	-23.64	-7 54	06.3	+127.5	4.520 371	+6673	20.33	1.95	22 13.8
	12	13 30	28.61	23.20	7 51	58.8	124.7	4.527 044	6935	20.30	1.94	22 09.4
	13	13 30	05.41	22.74	7 49	54.1	121.9	4.533 979	7197	20.27	1.94	22 05.1
	14	13 29	42.67	22.29	7 47	52.2	118.9	4.541 176	7455	20.24	1.94	22 00.8
	15	13 29	20.38	21.81	7 45	53.3	116.0	4.548 631	7709	20.21	1.93	21 56.5
	16	13 28	58.57	-21.31	-7 43	57.3	+112.8	4.556 340	+7961	20.17	1.93	21 52.3
	17	13 28	37.26		-7 42	04.5		4.564 301		20.14	1.93	21 48.0

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"			"	"	h	m
May 17	13	28	37.26	-20.81	-7	42	04.5	+109.8	4.564 301	+ 8209	20.14	1.93	21	48.0
18	13	28	16.45	20.30	7	40	14.7	106.5	4.572 510	8453	20.10	1.92	21	43.7
19	13	27	56.15	19.76	7	38	28.2	103.2	4.580 963	8694	20.06	1.92	21	39.4
20	13	27	36.39	19.22	7	36	45.0	99.9	4.589 657	8931	20.03	1.92	21	35.2
21	13	27	17.17	18.67	7	35	05.1	96.4	4.598 588	9163	19.99	1.91	21	31.0
22	13	26	58.50	-18.11	-7	33	28.7	+ 93.0	4.607 751	+ 9392	19.95	1.91	21	26.7
23	13	26	40.39	17.54	7	31	55.7	89.4	4.617 143	9615	19.91	1.91	21	22.5
24	13	26	22.85	16.95	7	30	26.3	85.8	4.626 758	9838	19.86	1.90	21	18.3
25	13	26	05.90	16.36	7	29	00.5	82.2	4.636 596	10051	19.82	1.90	21	14.1
26	13	25	49.54	15.77	7	27	38.3	78.5	4.646 647	10263	19.78	1.89	21	09.9
27	13	25	33.77	-15.16	-7	26	19.8	+ 74.8	4.656 910	+10470	19.74	1.89	21	05.7
28	13	25	18.61	14.56	7	25	05.0	71.0	4.667 380	10673	19.69	1.89	21	01.5
29	13	25	04.05	13.93	7	23	54.0	67.2	4.678 053	10870	19.65	1.88	20	57.4
30	13	24	50.12	13.32	7	22	46.8	63.4	4.688 923	11066	19.60	1.88	20	53.2
31	13	24	36.80	12.69	7	21	43.4	59.6	4.699 989	11256	19.56	1.87	20	49.1
June 1	13	24	24.11	-12.05	-7	20	43.8	+ 55.7	4.711 245	+11441	19.51	1.87	20	44.9
2	13	24	12.06	11.43	7	19	48.1	51.8	4.722 686	11624	19.46	1.86	20	40.8
3	13	24	00.63	10.78	7	18	56.3	47.8	4.734 310	11802	19.41	1.86	20	36.7
4	13	23	49.85	10.14	7	18	08.5	43.9	4.746 112	11977	19.37	1.85	20	32.6
5	13	23	39.71	9.49	7	17	24.6	40.0	4.758 089	12147	19.32	1.85	20	28.5
6	13	23	30.22	- 8.84	-7	16	44.6	+ 36.0	4.770 236	+12314	19.27	1.84	20	24.4
7	13	23	21.38	8.19	7	16	08.6	31.9	4.782 550	12476	19.22	1.84	20	20.4
8	13	23	13.19	7.52	7	15	36.7	27.9	4.795 026	12633	19.17	1.84	20	16.3
9	13	23	05.67	6.87	7	15	08.8	23.9	4.807 659	12789	19.12	1.83	20	12.2
10	13	22	58.80	6.20	7	14	44.9	19.9	4.820 448	12939	19.07	1.83	20	08.2
11	13	22	52.60	- 5.53	-7	14	25.0	+ 15.7	4.833 387	+13084	19.02	1.82	20	04.2
12	13	22	47.07	4.85	7	14	09.3	11.8	4.846 471	13227	18.96	1.82	20	00.2
13	13	22	42.22	4.19	7	13	57.5	7.6	4.859 698	13362	18.91	1.81	19	56.2
14	13	22	38.03	3.51	7	13	49.9	+ 3.6	4.873 060	13495	18.86	1.81	19	52.2
15	13	22	34.52	2.83	7	13	46.3	- 0.6	4.886 555	13622	18.81	1.80	19	48.2
16	13	22	31.69	- 2.16	-7	13	46.9	- 4.6	4.900 177	+13746	18.76	1.80	19	44.2
17	13	22	29.53	1.48	7	13	51.5	8.7	4.913 923	13866	18.70	1.79	19	40.3
18	13	22	28.05	0.80	7	14	00.2	12.8	4.927 789	13979	18.65	1.79	19	36.3
19	13	22	27.25	- 0.12	7	14	13.0	16.8	4.941 768	14088	18.60	1.78	19	32.4
20	13	22	27.13	+ 0.55	7	14	29.8	20.9	4.955 856	14192	18.55	1.78	19	28.5
21	13	22	27.68	+ 1.23	-7	14	50.7	- 24.9	4.970 048	+14292	18.49	1.77	19	24.5
22	13	22	28.91	1.91	7	15	15.6	29.0	4.984 340	14387	18.44	1.77	19	20.6
23	13	22	30.82	2.58	7	15	44.6	33.0	4.998 727	14478	18.39	1.76	19	16.8
24	13	22	33.40	3.25	7	16	17.6	37.0	5.013 205	14564	18.33	1.76	19	12.9
25	13	22	36.65	3.91	7	16	54.6	40.9	5.027 769	14645	18.28	1.75	19	09.0
26	13	22	40.56	+ 4.58	-7	17	35.5	- 44.9	5.042 414	+14723	18.23	1.75	19	05.1
27	13	22	45.14	5.24	7	18	20.4	48.8	5.057 137	14795	18.17	1.74	19	01.3
28	13	22	50.38	5.90	7	19	09.2	52.7	5.071 932	14864	18.12	1.74	18	57.5
29	13	22	56.28	6.55	7	20	01.9	56.5	5.086 796	14931	18.07	1.73	18	53.6
30	13	23	02.83	7.20	7	20	58.4	60.5	5.101 727	14990	18.02	1.72	18	49.8
July 1	13	23	10.03	+ 7.85	-7	21	58.9	- 64.2	5.116 717	+15049	17.96	1.72	18	46.0
2	13	23	17.88		-7	23	03.1		5.131 766		17.91	1.71	18	42.2

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Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich			
	h	m	s	s	°	'	"	"			"	"	h	m		
July	1	13	23	10.03	+ 7.85	-7	21	58.9	- 64.2	5.116 717	+15049	17.96	1.72	18	46.0	
	2	13	23	17.88	8.49	7	23	03.1	68.0	5.131 766	15101	17.91	1.71	18	42.2	
	3	13	23	26.37	9.13	7	24	11.1	71.8	5.146 867	15152	17.86	1.71	18	38.4	
	4	13	23	35.50	9.77	7	25	22.9	75.4	5.162 019	15199	17.80	1.70	18	34.7	
	5	13	23	45.27	10.40	7	26	38.3	79.2	5.177 218	15241	17.75	1.70	18	30.9	
	6	13	23	55.67	+11.04	-7	27	57.5	- 82.9	5.192 459	+15279	17.70	1.69	18	27.2	
	7	13	24	06.71	11.66	7	29	20.4	86.5	5.207 738	15315	17.65	1.69	18	23.4	
	8	13	24	18.37	12.29	7	30	46.9	90.2	5.223 053	15345	17.60	1.68	18	19.7	
	9	13	24	30.66	12.91	7	32	17.1	93.7	5.238 398	15374	17.55	1.68	18	16.0	
	10	13	24	43.57	13.53	7	33	50.8	97.4	5.253 772	15395	17.49	1.67	18	12.3	
	11	13	24	57.10	+14.15	-7	35	28.2	-100.8	5.269 167	+15416	17.44	1.67	18	08.6	
	12	13	25	11.25	14.75	7	37	09.0	104.3	5.284 583	15430	17.39	1.67	18	04.9	
	13	13	25	26.00	15.36	7	38	53.3	107.9	5.300 013	15443	17.34	1.66	18	01.2	
	14	13	25	41.36	15.97	7	40	41.2	111.2	5.315 456	15449	17.29	1.66	17	57.5	
	15	13	25	57.33	16.56	7	42	32.4	114.7	5.330 905	15452	17.24	1.65	17	53.9	
	16	13	26	13.89	+17.17	-7	44	27.1	-118.0	5.346 357	+15453	17.19	1.65	17	50.2	
	17	13	26	31.06	17.75	7	46	25.1	121.4	5.361 810	15448	17.14	1.64	17	46.6	
	18	13	26	48.81	18.34	7	48	26.5	124.6	5.377 258	15438	17.09	1.64	17	42.9	
	19	13	27	07.15	18.91	7	50	31.1	127.9	5.392 696	15425	17.04	1.63	17	39.3	
	20	13	27	26.06	19.50	7	52	39.0	131.1	5.408 121	15409	17.00	1.63	17	35.7	
	21	13	27	45.56	+20.06	-7	54	50.1	-134.3	5.423 530	+15388	16.95	1.62	17	32.1	
	22	13	28	05.62	20.62	7	57	04.4	137.4	5.438 918	15364	16.90	1.62	17	28.5	
	23	13	28	26.24	21.19	7	59	21.8	140.4	5.454 282	15336	16.85	1.61	17	24.9	
	24	13	28	47.43	21.73	8	01	42.2	143.5	5.469 618	15304	16.80	1.61	17	21.4	
	25	13	29	09.16	22.28	8	04	05.7	146.5	5.484 922	15271	16.76	1.60	17	17.8	
	26	13	29	31.44	+22.81	-8	06	32.2	-149.5	5.500 193	+15232	16.71	1.60	17	14.2	
	27	13	29	54.25	23.36	8	09	01.7	152.3	5.515 425	15192	16.66	1.60	17	10.7	
	28	13	30	17.61	23.87	8	11	34.0	155.2	5.530 617	15148	16.62	1.59	17	07.1	
	29	13	30	41.48	24.40	8	14	09.2	158.0	5.545 765	15101	16.57	1.59	17	03.6	
	30	13	31	05.88	24.92	8	16	47.2	160.8	5.560 866	15052	16.53	1.58	17	00.1	
	Aug.	31	13	31	30.80	+25.43	-8	19	28.0	-163.5	5.575 918	+14999	16.48	1.58	16	56.6
		1	13	31	56.23	25.94	8	22	11.5	166.2	5.590 917	14944	16.44	1.57	16	53.1
		2	13	32	22.17	26.44	8	24	57.7	168.9	5.605 861	14885	16.39	1.57	16	49.6
		3	13	32	48.61	26.93	8	27	46.6	171.5	5.620 746	14824	16.35	1.57	16	46.1
		4	13	33	15.54	27.44	8	30	38.1	174.0	5.635 570	14761	16.31	1.56	16	42.6
		5	13	33	42.98	+27.91	-8	33	32.1	-176.7	5.650 331	+14692	16.27	1.56	16	39.1
6		13	34	10.89	28.41	8	36	28.8	179.0	5.665 023	14623	16.22	1.55	16	35.7	
7		13	34	39.30	28.88	8	39	27.8	181.6	5.679 646	14550	16.18	1.55	16	32.2	
8		13	35	08.18	29.36	8	42	29.4	184.0	5.694 196	14472	16.14	1.55	16	28.8	
9		13	35	37.54	29.83	8	45	33.4	186.4	5.708 668	14395	16.10	1.54	16	25.3	
10		13	36	07.37	+30.29	-8	48	39.8	-188.7	5.723 063	+14311	16.06	1.54	16	21.9	
11		13	36	37.66	30.76	8	51	48.5	191.0	5.737 374	14227	16.02	1.53	16	18.5	
12		13	37	08.42	31.21	8	54	59.5	193.3	5.751 601	14137	15.98	1.53	16	15.1	
13		13	37	39.63	31.66	8	58	12.8	195.5	5.765 738	14047	15.94	1.53	16	11.7	
14		13	38	11.29	32.11	9	01	28.3	197.7	5.779 785	13950	15.90	1.52	16	08.3	
15		13	38	43.40	+32.54	-9	04	46.0	-199.8	5.793 735	+13853	15.86	1.52	16	04.9	
16	13	39	15.94		-9	08	05.8		5.807 588		15.83	1.52	16	01.5		

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Apparent Declination			True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	°	'	"			"	"	h	m
Aug. 16	13	39	15.94		- 9	08 05.8		5.807 588		15.83	1.52	16 01.5
17	13	39	48.93	+32.99	9	11 27.7	-201.9	5.821 340	+13752	15.79	1.51	15 58.1
18	13	40	22.34	33.41	9	14 51.7	204.0	5.834 988	13648	15.75	1.51	15 54.7
19	13	40	56.17	33.83	9	18 17.7	206.0	5.848 528	13540	15.71	1.50	15 51.4
20	13	41	30.42	34.25	9	21 45.6	207.9	5.861 959	13431	15.68	1.50	15 48.0
				34.66			209.8		13319			
21	13	42	05.08		- 9	25 15.4		5.875 278		15.64	1.50	15 44.6
22	13	42	40.15	+35.07	9	28 47.1	-211.7	5.888 482	+13204	15.61	1.49	15 41.3
23	13	43	15.61	35.46	9	32 20.6	213.5	5.901 568	13086	15.57	1.49	15 38.0
24	13	43	51.47	35.86	9	35 55.8	215.2	5.914 536	12968	15.54	1.49	15 34.6
25	13	44	27.71	36.24	9	39 32.9	217.1	5.927 381	12845	15.51	1.48	15 31.3
				36.63			218.7		12723			
26	13	45	04.34		- 9	43 11.6		5.940 104		15.47	1.48	15 28.0
27	13	45	41.34	+37.00	9	46 51.9	-220.3	5.952 700	+12596	15.44	1.48	15 24.7
28	13	46	18.71	37.37	9	50 33.8	221.9	5.965 169	12469	15.41	1.48	15 21.4
29	13	46	56.45	37.74	9	54 17.4	223.6	5.977 509	12340	15.38	1.47	15 18.1
30	13	47	34.55	38.10	9	58 02.4	225.0	5.989 717	12208	15.34	1.47	15 14.8
				38.47			226.6		12074			
31	13	48	13.02		-10	01 49.0		6.001 791		15.31	1.47	15 11.5
Sept. 1	13	48	51.83	+38.81	10	05 37.0	-228.0	6.013 730	+11939	15.28	1.46	15 08.2
2	13	49	31.00	39.17	10	09 26.4	229.4	6.025 532	11802	15.25	1.46	15 04.9
3	13	50	10.50	39.50	10	13 17.2	230.8	6.037 193	11661	15.22	1.46	15 01.6
4	13	50	50.35	39.85	10	17 09.3	232.1	6.048 711	11518	15.19	1.45	14 58.4
				40.19			233.4		11375			
5	13	51	30.54		-10	21 02.7		6.060 086		15.17	1.45	14 55.1
6	13	52	11.06	+40.52	10	24 57.4	-234.7	6.071 315	+11229	15.14	1.45	14 51.8
7	13	52	51.91	40.85	10	28 53.4	236.0	6.082 395	11080	15.11	1.45	14 48.6
8	13	53	33.08	41.17	10	32 50.5	237.1	6.093 324	10929	15.08	1.44	14 45.3
9	13	54	14.57	41.49	10	36 48.7	238.2	6.104 101	10777	15.06	1.44	14 42.1
				41.80			239.4		10621			
10	13	54	56.37		-10	40 48.1		6.114 722		15.03	1.44	14 38.9
11	13	55	38.49	+42.12	10	44 48.6	-240.5	6.125 185	+10463	15.01	1.44	14 35.6
12	13	56	20.91	42.42	10	48 50.1	241.5	6.135 489	10304	14.98	1.43	14 32.4
13	13	57	03.63	42.72	10	52 52.6	242.5	6.145 630	10141	14.96	1.43	14 29.2
14	13	57	46.65	43.02	10	56 56.1	243.5	6.155 607	9977	14.93	1.43	14 26.0
				43.30			244.3		9810			
15	13	58	29.95		-11	01 00.4		6.165 417		14.91	1.43	14 22.8
16	13	59	13.54	+43.59	11	05 05.7	-245.3	6.175 059	+ 9642	14.88	1.43	14 19.6
17	13	59	57.41	43.87	11	09 11.8	246.1	6.184 530	9471	14.86	1.42	14 16.4
18	14	00	41.55	44.14	11	13 18.7	246.9	6.193 830	9300	14.84	1.42	14 13.2
19	14	01	25.96	44.41	11	17 26.3	247.6	6.202 955	9125	14.82	1.42	14 10.0
				44.67			248.3		8951			
20	14	02	10.63		-11	21 34.6		6.211 906		14.80	1.42	14 06.8
21	14	02	55.55	+44.92	11	25 43.7	-249.1	6.220 680	+ 8774	14.77	1.41	14 03.6
22	14	03	40.73	45.18	11	29 53.3	249.6	6.229 276	8596	14.75	1.41	14 00.4
23	14	04	26.15	45.42	11	34 03.5	250.2	6.237 694	8418	14.73	1.41	13 57.2
24	14	05	11.82	45.67	11	38 14.3	250.8	6.245 932	8238	14.71	1.41	13 54.1
				45.90			251.4		8056			
25	14	05	57.72		-11	42 25.7		6.253 988		14.70	1.41	13 50.9
26	14	06	43.86	+46.14	11	46 37.5	-251.8	6.261 862	+ 7874	14.68	1.41	13 47.7
27	14	07	30.23	46.37	11	50 49.7	252.2	6.269 553	7691	14.66	1.40	13 44.6
28	14	08	16.82	46.59	11	55 02.4	252.7	6.277 058	7505	14.64	1.40	13 41.4
29	14	09	03.64	46.82	11	59 15.5	253.1	6.284 377	7319	14.62	1.40	13 38.3
				47.02			253.4		7132			
30	14	09	50.66		-12	03 28.9		6.291 509		14.61	1.40	13 35.1
Oct. 1	14	10	37.91	+47.25	12	07 42.6	-253.7	6.298 451	+ 6942	14.59	1.40	13 32.0

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich		
		h	m	s	s	°	'	"	"			"	"	h	m	
Oct.	1	14	10	37.91		-12	07	42.6		6.298 451		14.59	1.40	13	32.0	
	2	14	11	25.36	+47.45	12	11	56.6	-254.0	6.305 204	+6753	14.58	1.40	13	28.8	
	3	14	12	13.02	47.66	12	16	10.9	254.3	6.311 766	6562	14.56	1.39	13	25.7	
	4	14	13	00.88	47.86	12	20	25.4	254.5	6.318 136	6370	14.55	1.39	13	22.6	
	5	14	13	48.93	48.05	12	24	40.1	254.7	6.324 311	6175	14.53	1.39	13	19.4	
				48.25					254.8		5980					
	6	14	14	37.18		-12	28	54.9		6.330 291		14.52	1.39	13	16.3	
	7	14	15	25.61	+48.43	12	33	09.8	-254.9	6.336 073	+5782	14.51	1.39	13	13.2	
	8	14	16	14.23	48.62	12	37	24.9	255.1	6.341 658	5585	14.49	1.39	13	10.0	
	9	14	17	03.03	48.80	12	41	39.9	255.0	6.347 044	5386	14.48	1.39	13	06.9	
	10	14	17	52.01	48.98	12	45	55.1	255.2	6.352 228	5184	14.47	1.39	13	03.8	
				49.15					255.1		4981					
	11	14	18	41.16		-12	50	10.2		6.357 209		14.46	1.38	13	00.7	
	12	14	19	30.47	+49.31	12	54	25.2	-255.0	6.361 986	+4777	14.45	1.38	12	57.6	
	13	14	20	19.94	49.47	12	58	40.2	255.0	6.366 559	4573	14.44	1.38	12	54.5	
	14	14	21	09.56	49.62	13	02	55.0	254.8	6.370 924	4365	14.43	1.38	12	51.4	
	15	14	21	59.34	49.78	13	07	09.7	254.7	6.375 083	4159	14.42	1.38	12	48.3	
				49.92					254.5		3950					
	16	14	22	49.26		-13	11	24.2		6.379 033		14.41	1.38	12	45.1	
	17	14	23	39.31	+50.05	13	15	38.5	-254.3	6.382 774	+3741	14.40	1.38	12	42.0	
	18	14	24	29.50	50.19	13	19	52.4	253.9	6.386 307	3533	14.39	1.38	12	39.0	
	19	14	25	19.82	50.32	13	24	06.1	253.7	6.389 629	3322	14.38	1.38	12	35.9	
	20	14	26	10.25	50.43	13	28	19.5	253.4	6.392 741	3112	14.38	1.38	12	32.8	
				50.56					253.0		2902					
	21	14	27	00.81		-13	32	32.5		6.395 643		14.37	1.38	12	29.7	
	22	14	27	51.47	+50.66	13	36	45.2	-252.7	6.398 334	+2691	14.36	1.38	12	26.6	
	23	14	28	42.25	50.78	13	40	57.3	252.1	6.400 813	2479	14.36	1.37	12	23.5	
	24	14	29	33.13	50.88	13	45	09.1	251.8	6.403 082	2269	14.35	1.37	12	20.4	
	25	14	30	24.10	50.97	13	49	20.3	251.2	6.405 139	2057	14.35	1.37	12	17.3	
				51.07					250.7		1845					
	26	14	31	15.17		-13	53	31.0		6.406 984		14.34	1.37	12	14.2	
	27	14	32	06.34	+51.17	13	57	41.2	-250.2	6.408 615	+1631	14.34	1.37	12	11.1	
	28	14	32	57.59	51.25	14	01	50.8	249.6	6.410 035	1420	14.34	1.37	12	08.1	
	29	14	33	48.92	51.33	14	05	59.9	249.1	6.411 240	1205	14.34	1.37	12	05.0	
	30	14	34	40.33	51.41	14	10	08.3	248.4	6.412 233	993	14.33	1.37	12	01.9	
				51.48					247.7		778					
Nov.	31	14	35	31.81		-14	14	16.0		6.413 011		14.33	1.37	11	58.8	
	1	14	36	23.36	+51.55	14	18	23.1	-247.1	6.413 575	+ 564	14.33	1.37	11	55.8	
	2	14	37	14.98	51.62	14	22	29.4	246.3	6.413 923	348	14.33	1.37	11	52.7	
	3	14	38	06.65	51.67	14	26	35.1	245.7	6.414 057	+ 134	14.33	1.37	11	49.6	
	4	14	38	58.39	51.74	14	30	39.9	244.8	6.413 973	- 84	14.33	1.37	11	46.5	
				51.78					244.1		299					
	5	14	39	50.17		-14	34	44.0		6.413 674		14.33	1.37	11	43.5	
	6	14	40	42.00	+51.83	14	38	47.2	-243.2	6.413 158	- 516	14.33	1.37	11	40.4	
	7	14	41	33.87	51.87	14	42	49.7	242.5	6.412 424	734	14.33	1.37	11	37.3	
	8	14	42	25.78	51.91	14	46	51.2	241.5	6.411 473	951	14.34	1.37	11	34.2	
	9	14	43	17.72	51.94	14	50	51.8	240.6	6.410 302	1171	14.34	1.37	11	31.2	
				51.96					239.7		1389					
	10	14	44	09.68		-14	54	51.5		6.408 913		14.34	1.37	11	28.1	
	11	14	45	01.66	+51.98	14	58	50.3	-238.8	6.407 305	-1608	14.34	1.37	11	25.0	
	12	14	45	53.65	51.99	15	02	48.0	237.7	6.405 479	1826	14.35	1.37	11	22.0	
	13	14	46	45.65	52.00	15	06	44.8	236.8	6.403 433	2046	14.35	1.37	11	18.9	
14	14	47	37.65	52.00	15	10	40.5	235.7	6.401 171	2262	14.36	1.37	11	15.8		
			51.96					234.6		2482						
15	14	48	29.64		-15	14	35.1		6.398 689		14.36	1.38	11	12.8		
16	14	49	21.61	+51.97	-15	18	28.6	-233.5	6.395 991	-2698	14.37	1.38	11	09.7		

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s		°	'	"				"	"	h	m
Nov. 16	14	49	21.61	s	-15	18	28.6		6.395 991		14.37	1.38	11	09.7
17	14	50	13.57	+51.96	15	22	21.0	-232.4	6.393 075	- 2916	14.38	1.38	11	06.6
18	14	51	05.51	51.94	15	26	12.2	231.2	6.389 944	3131	14.38	1.38	11	03.5
19	14	51	57.42	51.91	15	30	02.2	230.0	6.386 597	3347	14.39	1.38	11	00.5
20	14	52	49.29	51.87	15	33	51.1	228.9	6.383 036	3561	14.40	1.38	10	57.4
				51.83				227.6		3774				
21	14	53	41.12		-15	37	38.7		6.379 262		14.41	1.38	10	54.3
22	14	54	32.91	+51.79	15	41	25.1	-226.4	6.375 273	- 3989	14.42	1.38	10	51.3
23	14	55	24.65	51.74	15	45	10.2	225.1	6.371 072	4201	14.43	1.38	10	48.2
24	14	56	16.33	51.68	15	48	53.9	223.7	6.366 659	4413	14.44	1.38	10	45.1
25	14	57	07.96	51.63	15	52	36.4	222.5	6.362 035	4624	14.45	1.38	10	42.0
				51.56				221.2		4836				
26	14	57	59.52		-15	56	17.6		6.357 199		14.46	1.38	10	39.0
27	14	58	51.01	+51.49	15	59	57.4	-219.8	6.352 154	- 5045	14.47	1.39	10	35.9
28	14	59	42.42	51.41	16	03	35.8	218.4	6.346 900	5254	14.48	1.39	10	32.8
29	15	00	33.76	51.34	16	07	12.8	217.0	6.341 436	5464	14.49	1.39	10	29.7
30	15	01	25.01	51.25	16	10	48.4	215.6	6.335 764	5672	14.51	1.39	10	26.6
				51.16				214.2		5880				
Dec. 1	15	02	16.17		-16	14	22.6		6.329 884		14.52	1.39	10	23.6
2	15	03	07.23	+51.06	16	17	55.3	-212.7	6.323 797	- 6087	14.53	1.39	10	20.5
3	15	03	58.19	50.96	16	21	26.5	211.2	6.317 504	6293	14.55	1.39	10	17.4
4	15	04	49.04	50.85	16	24	56.3	209.8	6.311 003	6501	14.56	1.39	10	14.3
5	15	05	39.78	50.74	16	28	24.4	208.1	6.304 298	6705	14.58	1.40	10	11.2
				50.62				206.7		6911				
6	15	06	30.40		-16	31	51.1		6.297 387		14.60	1.40	10	08.1
7	15	07	20.89	+50.49	16	35	16.3	-205.2	6.290 273	- 7114	14.61	1.40	10	05.0
8	15	08	11.24	50.35	16	38	39.8	203.5	6.282 955	7318	14.63	1.40	10	01.9
9	15	09	01.46	50.22	16	42	01.7	201.9	6.275 435	7520	14.65	1.40	9	58.8
10	15	09	51.52	50.06	16	45	22.1	200.4	6.267 713	7722	14.66	1.40	9	55.7
				49.91				198.6		7923				
11	15	10	41.43		-16	48	40.7		6.259 790		14.68	1.41	9	52.6
12	15	11	31.17	+49.74	16	51	57.8	-197.1	6.251 670	- 8120	14.70	1.41	9	49.5
13	15	12	20.75	49.58	16	55	13.1	195.3	6.243 353	8317	14.72	1.41	9	46.4
14	15	13	10.14	49.39	16	58	26.7	193.6	6.234 839	8514	14.74	1.41	9	43.3
15	15	13	59.36	49.22	17	01	38.6	191.9	6.226 134	8705	14.76	1.41	9	40.2
				49.02				190.2		8898				
16	15	14	48.38		-17	04	48.8		6.217 236		14.78	1.42	9	37.0
17	15	15	37.20	+48.82	17	07	57.2	-188.4	6.208 147	- 9089	14.80	1.42	9	33.9
18	15	16	25.82	48.62	17	11	03.8	186.6	6.198 871	9276	14.83	1.42	9	30.8
19	15	17	14.23	48.41	17	14	08.7	184.9	6.189 408	9463	14.85	1.42	9	27.7
20	15	18	02.42	48.19	17	17	11.7	183.0	6.179 761	9647	14.87	1.42	9	24.5
				47.97				181.3		9830				
21	15	18	50.39		-17	20	13.0		6.169 931		14.90	1.43	9	21.4
22	15	19	38.13	+47.74	17	23	12.4	-179.4	6.159 920	-10011	14.92	1.43	9	18.2
23	15	20	25.64	47.51	17	26	10.0	177.6	6.149 730	10190	14.95	1.43	9	15.1
24	15	21	12.91	47.27	17	29	05.7	175.7	6.139 363	10367	14.97	1.43	9	11.9
25	15	21	59.93	47.02	17	31	59.6	173.9	6.128 820	10543	15.00	1.44	9	08.8
				46.76				172.0		10716				
26	15	22	46.69		-17	34	51.6		6.118 104		15.02	1.44	9	05.6
27	15	23	33.20	+46.51	17	37	41.7	-170.1	6.107 215	-10889	15.05	1.44	9	02.5
28	15	24	19.43	46.23	17	40	29.9	168.2	6.096 156	11059	15.08	1.44	8	59.3
29	15	25	05.40	45.97	17	43	16.2	166.3	6.084 927	11229	15.10	1.45	8	56.1
30	15	25	51.08	45.68	17	46	00.6	164.4	6.073 533	11394	15.13	1.45	8	53.0
				45.40				162.4		11560				
31	15	26	36.48		-17	48	43.0		6.061 973		15.16	1.45	8	49.8
32	15	27	21.59	+45.11	17	51	23.5	-160.5	6.050 249	-11724	15.19	1.45	8	46.6

JUPITER, 1958
FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	" "	"	° ' "	"		
Jan.	1	198 44 38.2	4 31.95	-08.0	+1 17 29.4	-0.94	0.736 8129	-26.9
	5	199 02 46.0	4 31.96	08.3	1 17 25.6	0.97	0.736 8018	28.5
	9	199 20 53.9	4 31.98	08.6	1 17 21.7	1.00	0.736 7901	30.0
	13	199 39 01.8	4 32.00	08.8	1 17 17.6	1.04	0.736 7778	31.5
	17	199 57 09.9	4 32.01	09.1	1 17 13.4	1.07	0.736 7649	33.0
Feb.	21	200 15 17.9	4 32.03	-09.4	+1 17 09.1	-1.10	0.736 7514	-34.5
	25	200 33 26.1	4 32.05	09.6	1 17 04.6	1.13	0.736 7373	36.1
	29	200 51 34.3	4 32.06	09.9	1 17 00.0	1.17	0.736 7226	37.6
	2	201 09 42.6	4 32.08	10.1	1 16 55.3	1.20	0.736 7072	39.2
	6	201 27 50.9	4 32.10	10.4	1 16 50.4	1.23	0.736 6912	40.8
	10	201 45 59.4	4 32.12	-10.7	+1 16 45.4	-1.26	0.736 6746	-42.3
	14	202 04 07.9	4 32.14	10.9	1 16 40.3	1.29	0.736 6573	43.9
	18	202 22 16.5	4 32.17	11.2	1 16 35.1	1.33	0.736 6395	45.4
	22	202 40 25.2	4 32.19	11.4	1 16 29.7	1.36	0.736 6211	46.9
	26	202 58 34.0	4 32.22	11.7	1 16 24.2	1.39	0.736 6020	48.4
Mar.	2	203 16 42.9	4 32.24	-11.9	+1 16 18.6	-1.42	0.736 5823	-49.9
	6	203 34 51.9	4 32.27	12.2	1 16 12.9	1.45	0.736 5621	51.5
	10	203 53 01.1	4 32.29	12.4	1 16 07.0	1.49	0.736 5412	53.1
	14	204 11 10.3	4 32.32	12.7	1 16 01.0	1.52	0.736 5196	54.6
	18	204 29 19.6	4 32.34	12.9	1 15 54.8	1.55	0.736 4975	56.1
	22	204 47 29.0	4 32.37	-13.2	+1 15 48.6	-1.58	0.736 4748	-57.6
	26	205 05 38.5	4 32.40	13.4	1 15 42.2	1.61	0.736 4514	59.2
	30	205 23 48.2	4 32.43	13.7	1 15 35.7	1.64	0.736 4274	60.9
	3	205 41 58.0	4 32.47	13.9	1 15 29.0	1.68	0.736 4028	62.4
	7	206 00 07.9	4 32.49	14.2	1 15 22.3	1.71	0.736 3775	63.9
Apr.	11	206 18 18.0	4 32.52	-14.4	+1 15 15.4	-1.74	0.736 3517	-65.3
	15	206 36 28.1	4 32.56	14.6	1 15 08.3	1.77	0.736 3252	66.8
	19	206 54 38.4	4 32.59	14.9	1 15 01.2	1.80	0.736 2982	68.4
	23	207 12 48.8	4 32.63	15.1	1 14 53.9	1.84	0.736 2706	69.9
	27	207 30 59.4	4 32.66	15.3	1 14 46.5	1.87	0.736 2423	71.4
May	1	207 49 10.1	4 32.70	-15.6	+1 14 39.0	-1.90	0.736 2134	-73.0
	5	208 07 21.0	4 32.73	15.8	1 14 31.3	1.93	0.736 1840	74.4
	9	208 25 32.0	4 32.77	16.0	1 14 23.5	1.96	0.736 1539	75.9
	13	208 43 43.1	4 32.81	16.3	1 14 15.6	1.99	0.736 1233	77.4
	17	209 01 54.4	4 32.85	16.5	1 14 07.6	2.02	0.736 0920	79.0
	21	209 20 05.9	4 32.88	-16.7	+1 13 59.4	-2.06	0.736 0601	-80.5
	25	209 38 17.5	4 32.92	16.9	1 13 51.1	2.09	0.736 0276	82.1
	29	209 56 29.3	4 32.97	17.1	1 13 42.7	2.12	0.735 9945	83.5
	2	210 14 41.2	4 33.01	17.4	1 13 34.2	2.15	0.735 9608	85.0
	6	210 32 53.4	4 33.05	17.6	1 13 25.5	2.18	0.735 9265	86.5
June	10	210 51 05.6	4 33.09	-17.8	+1 13 16.8	-2.21	0.735 8916	-87.9
	14	211 09 18.1	4 33.14	18.0	1 13 07.8	2.24	0.735 8562	89.4
	18	211 27 30.8	4 33.19	18.2	1 12 58.8	2.27	0.735 8201	91.0
	22	211 45 43.6	4 33.23	18.4	1 12 49.7	2.31	0.735 7834	92.5
	26	212 03 56.6	4 33.28	18.6	1 12 40.4	2.34	0.735 7461	94.0
	30	212 22 09.8	4 33.32	-18.8	+1 12 31.0	-2.37	0.735 7082	-95.4
	4	212 40 23.2	4 33.37	-19.0	+1 12 21.4	-2.40	0.735 6698	-96.9

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	' "	"	° ' "	"		
July	4	212 40 23.2	4 33.37	-19.0	+1 12 21.4	-2.40	0.735 6698	-96.9
	8	212 58 36.7	4 33.42	19.2	1 12 11.8	2.43	0.735 6307	98.4
	12	213 16 50.5	4 33.47	19.4	1 12 02.0	2.46	0.735 5910	99.9
	16	213 35 04.5	4 33.52	19.6	1 11 52.1	2.49	0.735 5508	101.4
	20	213 53 18.7	4 33.57	19.8	1 11 42.1	2.52	0.735 5100	102.9
Aug.	24	214 11 33.0	4 33.62	-20.0	+1 11 31.9	-2.55	0.735 4685	-104.3
	28	214 29 47.6	4 33.67	20.2	1 11 21.7	2.58	0.735 4265	105.7
	1	214 48 02.4	4 33.73	20.4	1 11 11.3	2.61	0.735 3840	107.2
	5	215 06 17.4	4 33.78	20.5	1 11 00.8	2.64	0.735 3408	108.7
	9	215 24 32.7	4 33.84	20.7	1 10 50.1	2.67	0.735 2970	110.3
	13	215 42 48.1	4 33.89	-20.9	+1 10 39.4	-2.71	0.735 2526	-111.7
	17	216 01 03.8	4 33.94	21.1	1 10 28.5	2.74	0.735 2077	113.1
	21	216 19 19.7	4 34.00	21.2	1 10 17.5	2.77	0.735 1622	114.5
	25	216 37 35.8	4 34.06	21.4	1 10 06.4	2.80	0.735 1161	115.9
	29	216 55 52.1	4 34.12	21.6	1 09 55.1	2.83	0.735 0694	117.5
Sept.	2	217 14 08.8	4 34.18	-21.8	+1 09 43.8	-2.86	0.735 0222	-118.9
	6	217 32 25.6	4 34.24	21.9	1 09 32.3	2.89	0.734 9743	120.3
	10	217 50 42.7	4 34.30	22.1	1 09 20.7	2.92	0.734 9259	121.8
	14	218 09 00.0	4 34.36	22.2	1 09 08.9	2.95	0.734 8769	123.2
	18	218 27 17.5	4 34.42	22.4	1 08 57.1	2.98	0.734 8274	124.5
	22	218 45 35.3	4 34.48	-22.6	+1 08 45.1	-3.01	0.734 7773	-126.0
Oct.	26	219 03 53.4	4 34.55	22.7	1 08 33.0	3.04	0.734 7266	127.4
	30	219 22 11.7	4 34.62	22.9	1 08 20.8	3.07	0.734 6753	128.9
	4	219 40 30.3	4 34.68	23.0	1 08 08.5	3.10	0.734 6235	130.3
	8	219 58 49.2	4 34.75	23.2	1 07 56.1	3.13	0.734 5711	131.8
	12	220 17 08.3	4 34.81	-23.3	+1 07 43.5	-3.15	0.734 5181	-133.2
	16	220 35 27.6	4 34.88	23.4	1 07 30.8	3.18	0.734 4646	134.6
	20	220 53 47.3	4 34.95	23.6	1 07 18.0	3.22	0.734 4105	136.0
	24	221 12 07.2	4 35.02	23.7	1 07 05.1	3.25	0.734 3558	137.4
	28	221 30 27.4	4 35.09	23.8	1 06 52.1	3.28	0.734 3006	138.8
	31	221 48 47.9	4 35.16	-24.0	+1 06 38.9	-3.30	0.734 2447	-140.3
Nov.	5	222 07 08.7	4 35.23	24.1	1 06 25.7	3.33	0.734 1883	141.8
	9	222 25 29.7	4 35.30	24.2	1 06 12.3	3.36	0.734 1313	143.2
	13	222 43 51.0	4 35.37	24.3	1 05 58.8	3.39	0.734 0738	144.5
	17	223 02 12.7	4 35.45	24.5	1 05 45.2	3.42	0.734 0157	145.9
	21	223 20 34.6	4 35.52	-24.6	+1 05 31.4	-3.45	0.733 9571	-147.2
Dec.	25	223 38 56.8	4 35.59	24.7	1 05 17.6	3.48	0.733 8979	148.7
	29	223 57 19.3	4 35.67	24.8	1 05 03.6	3.51	0.733 8382	150.1
	3	224 15 42.2	4 35.74	24.9	1 04 49.5	3.54	0.733 7779	151.4
	7	224 34 05.3	4 35.82	25.0	1 04 35.3	3.57	0.733 7171	152.8
	11	224 52 28.7	4 35.90	-25.1	+1 04 21.0	-3.59	0.733 6557	-154.1
	15	225 10 52.5	4 35.98	25.2	1 04 06.6	3.62	0.733 5938	155.6
	19	225 29 16.5	4 36.05	25.3	1 03 52.1	3.65	0.733 5312	157.0
	23	225 47 40.9	4 36.13	25.4	1 03 37.4	3.68	0.733 4682	158.3
	27	226 06 05.6	4 36.21	25.5	1 03 22.6	3.71	0.733 4046	159.6
	31	226 24 30.6	4 36.29	-25.6	+1 03 07.8	-3.74	0.733 3405	-160.9
	35	226 42 55.9	4 36.38	-25.7	+1 02 52.8	-3.77	0.733 2759	-162.3

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
		h m s	° ' "		"	"	h m
Jan.	0	17 14 01.52	-21 40 56.1	10.965 06	6.80	0.80	10 35.9
	1	17 14 30.73	21 41 29.3	10.959 28	6.80	0.80	10 32.4
	2	17 14 59.82	21 42 01.9	10.953 24	6.81	0.80	10 29.0
	3	17 15 28.80	21 42 33.9	10.946 97	6.81	0.80	10 25.5
	4	17 15 57.67	21 43 05.3	10.940 45	6.82	0.80	10 22.1
	5	17 16 26.40	-21 43 36.2	10.933 69	6.82	0.80	10 18.6
	6	17 16 55.01	21 44 06.5	10.926 69	6.82	0.81	10 15.2
	7	17 17 23.49	21 44 36.3	10.919 46	6.83	0.81	10 11.7
	8	17 17 51.82	21 45 05.4	10.911 98	6.83	0.81	10 08.2
	9	17 18 20.02	21 45 34.0	10.904 28	6.84	0.81	10 04.8
	10	17 18 48.06	-21 46 02.1	10.896 34	6.84	0.81	10 01.3
	11	17 19 15.96	21 46 29.5	10.888 17	6.85	0.81	9 57.8
	12	17 19 43.70	21 46 56.4	10.879 77	6.85	0.81	9 54.4
	13	17 20 11.28	21 47 22.8	10.871 13	6.86	0.81	9 50.9
	14	17 20 38.68	21 47 48.6	10.862 28	6.87	0.81	9 47.4
	15	17 21 05.92	-21 48 13.8	10.853 19	6.87	0.81	9 43.9
	16	17 21 32.98	21 48 38.4	10.843 89	6.88	0.81	9 40.4
	17	17 21 59.85	21 49 02.5	10.834 36	6.88	0.81	9 37.0
	18	17 22 26.54	21 49 26.0	10.824 62	6.89	0.81	9 33.5
	19	17 22 53.03	21 49 49.0	10.814 65	6.90	0.81	9 30.0
	20	17 23 19.32	-21 50 11.4	10.804 48	6.90	0.81	9 26.5
	21	17 23 45.40	21 50 33.3	10.794 09	6.91	0.82	9 23.0
	22	17 24 11.27	21 50 54.6	10.783 49	6.92	0.82	9 19.5
	23	17 24 36.93	21 51 15.4	10.772 69	6.92	0.82	9 16.0
	24	17 25 02.37	21 51 35.7	10.761 69	6.93	0.82	9 12.4
	25	17 25 27.58	-21 51 55.4	10.750 48	6.94	0.82	9 08.9
	26	17 25 52.56	21 52 14.6	10.739 08	6.94	0.82	9 05.4
	27	17 26 17.31	21 52 33.2	10.727 49	6.95	0.82	9 01.9
	28	17 26 41.82	21 52 51.3	10.715 70	6.96	0.82	8 58.4
	29	17 27 06.08	21 53 08.9	10.703 73	6.97	0.82	8 54.8
	30	17 27 30.09	-21 53 26.0	10.691 57	6.97	0.82	8 51.3
Feb.	31	17 27 53.85	21 53 42.6	10.679 23	6.98	0.82	8 47.8
	1	17 28 17.35	21 53 58.6	10.666 72	6.99	0.83	8 44.2
	2	17 28 40.59	21 54 14.2	10.654 03	7.00	0.83	8 40.7
	3	17 29 03.57	21 54 29.3	10.641 16	7.01	0.83	8 37.1
	4	17 29 26.28	-21 54 43.8	10.628 13	7.02	0.83	8 33.6
	5	17 29 48.71	21 54 57.9	10.614 94	7.03	0.83	8 30.0
	6	17 30 10.86	21 55 11.5	10.601 58	7.03	0.83	8 26.4
	7	17 30 32.74	21 55 24.6	10.588 06	7.04	0.83	8 22.9
	8	17 30 54.33	21 55 37.2	10.574 39	7.05	0.83	8 19.3
	9	17 31 15.62	-21 55 49.4	10.560 56	7.06	0.83	8 15.7
	10	17 31 36.62	21 56 01.1	10.546 58	7.07	0.83	8 12.1
	11	17 31 57.32	21 56 12.3	10.532 45	7.08	0.84	8 08.5
	12	17 32 17.72	21 56 23.1	10.518 18	7.09	0.84	8 04.9
	13	17 32 37.81	21 56 33.5	10.503 77	7.10	0.84	8 01.3
	14	17 32 57.58	-21 56 43.4	10.489 22	7.11	0.84	7 57.7
	15	17 33 17.03	-21 56 52.9	10.474 54	7.12	0.84	7 54.1

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Apparent Declination			True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	°	'	"			"	"	h m
Feb. 15	17	33	17.03	-21	56	52.9	10.474 54	-1481	7.12	0.84	7 54.1
16	17	33	36.16	21	57	02.0	10.459 73	1493	7.13	0.84	7 50.5
17	17	33	54.96	21	57	10.7	10.444 80	1506	7.14	0.84	7 46.9
18	17	34	13.43	21	57	18.9	10.429 74	1517	7.15	0.84	7 43.2
19	17	34	31.56	21	57	26.8	10.414 57	1529	7.16	0.84	7 39.6
20	17	34	49.35	-21	57	34.2	10.399 28	-1539	7.17	0.85	7 36.0
21	17	35	06.80	21	57	41.3	10.383 89	1550	7.18	0.85	7 32.3
22	17	35	23.89	21	57	47.9	10.368 39	1559	7.19	0.85	7 28.7
23	17	35	40.64	21	57	54.2	10.352 80	1570	7.20	0.85	7 25.0
24	17	35	57.03	21	58	00.1	10.337 10	1578	7.21	0.85	7 21.4
25	17	36	13.05	-21	58	05.7	10.321 32	-1587	7.22	0.85	7 17.7
26	17	36	28.72	21	58	10.9	10.305 45	1595	7.24	0.85	7 14.0
27	17	36	44.02	21	58	15.7	10.289 50	1603	7.25	0.86	7 10.3
28	17	36	58.95	21	58	20.2	10.273 47	1610	7.26	0.86	7 06.7
Mar. 1	17	37	13.51	21	58	24.3	10.257 37	1617	7.27	0.86	7 03.0
2	17	37	27.69	-21	58	28.1	10.241 20	-1623	7.28	0.86	6 59.3
3	17	37	41.50	21	58	31.6	10.224 97	1630	7.29	0.86	6 55.6
4	17	37	54.93	21	58	34.8	10.208 67	1635	7.30	0.86	6 51.9
5	17	38	07.97	21	58	37.6	10.192 32	1640	7.32	0.86	6 48.1
6	17	38	20.63	21	58	40.1	10.175 92	1645	7.33	0.86	6 44.4
7	17	38	32.91	-21	58	42.4	10.159 47	-1649	7.34	0.87	6 40.7
8	17	38	44.79	21	58	44.3	10.142 98	1654	7.35	0.87	6 36.9
9	17	38	56.28	21	58	45.9	10.126 44	1657	7.36	0.87	6 33.2
10	17	39	07.37	21	58	47.3	10.109 87	1660	7.38	0.87	6 29.5
11	17	39	18.07	21	58	48.3	10.093 27	1663	7.39	0.87	6 25.7
12	17	39	28.36	-21	58	49.1	10.076 64	-1665	7.40	0.87	6 21.9
13	17	39	38.25	21	58	49.7	10.059 99	1667	7.41	0.87	6 18.2
14	17	39	47.72	21	58	49.9	10.043 32	1669	7.42	0.88	6 14.4
15	17	39	56.79	21	58	50.0	10.026 63	1669	7.44	0.88	6 10.6
16	17	40	05.45	21	58	49.7	10.009 94	1669	7.45	0.88	6 06.8
17	17	40	13.69	-21	58	49.3	9.993 25	-1670	7.46	0.88	6 03.0
18	17	40	21.51	21	58	48.6	9.976 55	1668	7.47	0.88	5 59.2
19	17	40	28.91	21	58	47.7	9.959 87	1668	7.49	0.88	5 55.4
20	17	40	35.89	21	58	46.5	9.943 19	1666	7.50	0.89	5 51.6
21	17	40	42.44	21	58	45.2	9.926 53	1663	7.51	0.89	5 47.8
22	17	40	48.57	-21	58	43.6	9.909 90	-1661	7.52	0.89	5 43.9
23	17	40	54.28	21	58	41.8	9.893 29	1658	7.54	0.89	5 40.1
24	17	40	59.56	21	58	39.8	9.876 71	1654	7.55	0.89	5 36.2
25	17	41	04.41	21	58	37.6	9.860 17	1650	7.56	0.89	5 32.4
26	17	41	08.83	21	58	35.2	9.843 67	1645	7.58	0.89	5 28.5
27	17	41	12.83	-21	58	32.6	9.827 22	-1640	7.59	0.90	5 24.7
28	17	41	16.40	21	58	29.8	9.810 82	1634	7.60	0.90	5 20.8
29	17	41	19.54	21	58	26.8	9.794 48	1628	7.61	0.90	5 16.9
30	17	41	22.25	21	58	23.7	9.778 20	1622	7.63	0.90	5 13.0
31	17	41	24.53	21	58	20.3	9.761 98	1615	7.64	0.90	5 09.1
Apr. 1	17	41	26.38	-21	58	16.8	9.745 83	-1607	7.65	0.90	5 05.2
2	17	41	27.81	-21	58	13.1	9.729 76		7.66	0.90	5 01.3

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich		
		h	m	s		°	'	"				"	"	h	m	
Apr.	1	17	41	26.38	s	-21	58	16.8	"	9.745	83		7.65	0.90	5	05.2
	2	17	41	27.81	+ 1.43	21	58	13.1	+3.7	9.729	76	-1607	7.66	0.90	5	01.3
	3	17	41	28.81	1.00	21	58	09.3	3.8	9.713	77	1599	7.68	0.91	4	57.4
	4	17	41	29.38	0.57	21	58	05.3	4.0	9.697	87	1590	7.69	0.91	4	53.5
	5	17	41	29.53	+ 0.15	21	58	01.1	4.2	9.682	05	1582	7.70	0.91	4	49.5
					- 0.27				4.3			1573				
	6	17	41	29.26	- 0.71	-21	57	56.8	+4.5	9.666	32	-1563	7.71	0.91	4	45.6
	7	17	41	28.55	1.12	21	57	52.3	4.6	9.650	69	1553	7.73	0.91	4	41.7
	8	17	41	27.43	1.55	21	57	47.7	4.8	9.635	16	1542	7.74	0.91	4	37.7
	9	17	41	25.88	1.98	21	57	42.9	4.9	9.619	74	1531	7.75	0.91	4	33.7
	10	17	41	23.90	2.40	21	57	38.0	5.1	9.604	43	1520	7.76	0.92	4	29.8
	11	17	41	21.50	- 2.82	-21	57	32.9	+5.2	9.589	23	-1508	7.78	0.92	4	25.8
	12	17	41	18.68	3.24	21	57	27.7	5.3	9.574	15	1495	7.79	0.92	4	21.8
	13	17	41	15.44	3.66	21	57	22.4	5.4	9.559	20	1482	7.80	0.92	4	17.8
	14	17	41	11.78	4.07	21	57	17.0	5.6	9.544	38	1469	7.81	0.92	4	13.8
	15	17	41	07.71	4.50	21	57	11.4	5.7	9.529	69	1454	7.83	0.92	4	09.8
	16	17	41	03.21	- 4.90	-21	57	05.7	+5.9	9.515	15	-1441	7.84	0.92	4	05.8
	17	17	40	58.31	5.32	21	56	59.8	6.0	9.500	74	1425	7.85	0.93	4	01.8
	18	17	40	52.99	5.72	21	56	53.8	6.1	9.486	49	1410	7.86	0.93	3	57.8
	19	17	40	47.27	6.13	21	56	47.7	6.2	9.472	39	1394	7.87	0.93	3	53.8
	20	17	40	41.14	6.53	21	56	41.5	6.3	9.458	45	1378	7.88	0.93	3	49.7
	21	17	40	34.61	- 6.93	-21	56	35.2	+6.5	9.444	67	-1361	7.90	0.93	3	45.7
	22	17	40	27.68	7.32	21	56	28.7	6.6	9.431	06	1344	7.91	0.93	3	41.7
	23	17	40	20.36	7.71	21	56	22.1	6.7	9.417	62	1326	7.92	0.93	3	37.6
	24	17	40	12.65	8.10	21	56	15.4	6.8	9.404	36	1308	7.93	0.94	3	33.5
	25	17	40	04.55	8.48	21	56	08.6	7.0	9.391	28	1290	7.94	0.94	3	29.5
	26	17	39	56.07	- 8.85	-21	56	01.6	+7.0	9.378	38	-1270	7.95	0.94	3	25.4
	27	17	39	47.22	9.23	21	55	54.6	7.3	9.365	68	1252	7.96	0.94	3	21.3
	28	17	39	37.99	9.59	21	55	47.3	7.3	9.353	16	1231	7.97	0.94	3	17.2
	29	17	39	28.40	9.95	21	55	40.0	7.4	9.340	85	1212	7.98	0.94	3	13.1
30	17	39	18.45	10.31	21	55	32.6	7.5	9.328	73	1191	7.99	0.94	3	09.0	
May	1	17	39	08.14	-10.67	-21	55	25.1	+7.7	9.316	82	-1171	8.00	0.94	3	04.9
	2	17	38	57.47	11.00	21	55	17.4	7.7	9.305	11	1149	8.01	0.95	3	00.8
	3	17	38	46.47	11.35	21	55	09.7	7.9	9.293	62	1128	8.02	0.95	2	56.7
	4	17	38	35.12	11.69	21	55	01.8	8.0	9.282	34	1106	8.03	0.95	2	52.6
	5	17	38	23.43	12.02	21	54	53.8	8.0	9.271	28	1084	8.04	0.95	2	48.5
	6	17	38	11.41	-12.34	-21	54	45.8	+8.2	9.260	44	-1062	8.05	0.95	2	44.3
	7	17	37	59.07	12.67	21	54	37.6	8.3	9.249	82	1039	8.06	0.95	2	40.2
	8	17	37	46.40	12.98	21	54	29.3	8.4	9.239	43	1016	8.07	0.95	2	36.1
	9	17	37	33.42	13.29	21	54	20.9	8.5	9.229	27	992	8.08	0.95	2	31.9
	10	17	37	20.13	13.60	21	54	12.4	8.6	9.219	35	968	8.09	0.95	2	27.8
	11	17	37	06.53	-13.89	-21	54	03.8	+8.7	9.209	67	- 945	8.10	0.96	2	23.6
	12	17	36	52.64	14.18	21	53	55.1	8.8	9.200	22	919	8.11	0.96	2	19.4
	13	17	36	38.46	14.47	21	53	46.3	8.9	9.191	03	895	8.11	0.96	2	15.3
	14	17	36	23.99	14.74	21	53	37.4	9.1	9.182	08	869	8.12	0.96	2	11.1
	15	17	36	09.25	15.01	21	53	28.3	9.0	9.173	39	844	8.13	0.96	2	06.9
	16	17	35	54.24	-15.28	-21	53	19.3	+9.2	9.164	95	- 818	8.14	0.96	2	02.7
	17	17	35	38.96		-21	53	10.1		9.156	77		8.14	0.96	1	58.6

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"			"	"	h	m
May 17	17	35	38.96	-15.53	-21	53	10.1	+ 9.4	9.156 77	-792	8.14	0.96	1	58.6
18	17	35	23.43	15.77	21	53	00.7	9.4	9.148 85	766	8.15	0.96	1	54.4
19	17	35	07.66	16.01	21	52	51.3	9.5	9.141 19	738	8.16	0.96	1	50.2
20	17	34	51.65	16.25	21	52	41.8	9.5	9.133 81	712	8.16	0.96	1	46.0
21	17	34	35.40	16.46	21	52	32.3	9.7	9.126 69	685	8.17	0.96	1	41.8
22	17	34	18.94	-16.67	-21	52	22.6	+ 9.8	9.119 84	-657	8.18	0.96	1	37.6
23	17	34	02.27	16.88	21	52	12.8	9.8	9.113 27	629	8.18	0.97	1	33.4
24	17	33	45.39	17.06	21	52	03.0	9.9	9.106 98	602	8.19	0.97	1	29.1
25	17	33	28.33	17.26	21	51	53.1	10.0	9.100 96	573	8.19	0.97	1	24.9
26	17	33	11.07	17.43	21	51	43.1	10.1	9.095 23	546	8.20	0.97	1	20.7
27	17	32	53.64	-17.59	-21	51	33.0	+10.2	9.089 77	-517	8.20	0.97	1	16.5
28	17	32	36.05	17.76	21	51	22.8	10.2	9.084 60	488	8.21	0.97	1	12.3
29	17	32	18.29	17.90	21	51	12.6	10.2	9.079 72	460	8.21	0.97	1	08.0
30	17	32	00.39	18.04	21	51	02.4	10.4	9.075 12	432	8.22	0.97	1	03.8
31	17	31	42.35	18.17	21	50	52.0	10.3	9.070 80	402	8.22	0.97	0	59.6
June 1	17	31	24.18	-18.30	-21	50	41.7	+10.4	9.066 78	-374	8.22	0.97	0	55.4
2	17	31	05.88	18.41	21	50	31.3	10.5	9.063 04	344	8.23	0.97	0	51.1
3	17	30	47.47	18.52	21	50	20.8	10.5	9.059 60	316	8.23	0.97	0	46.9
4	17	30	28.95	18.61	21	50	10.3	10.6	9.056 44	286	8.23	0.97	0	42.6
5	17	30	10.34	18.70	21	49	59.7	10.5	9.053 58	257	8.24	0.97	0	38.4
6	17	29	51.64	-18.78	-21	49	49.2	+10.6	9.051 01	-227	8.24	0.97	0	34.2
7	17	29	32.86	18.86	21	49	38.6	10.6	9.048 74	198	8.24	0.97	0	29.9
8	17	29	14.00	18.91	21	49	28.0	10.7	9.046 76	168	8.24	0.97	0	25.7
9	17	28	55.09	18.96	21	49	17.3	10.6	9.045 08	138	8.24	0.97	0	21.4
10	17	28	36.13	19.00	21	49	06.7	10.6	9.043 70	108	8.25	0.97	0	17.2
11	17	28	17.13	-19.04	-21	48	56.1	+10.7	9.042 62	- 79	8.25	0.97	0	12.9
12	17	27	58.09	19.05	21	48	45.4	10.6	9.041 83	49	8.25	0.97	0	08.7
13	17	27	39.04	19.07	21	48	34.8	10.6	9.041 34	- 18	8.25	0.97	0	04.4
14	17	27	19.97	19.07	21	48	24.2	10.6	9.041 16	+ 11	8.25	0.97	0	00.2
15	17	27	00.90	19.06	21	48	13.6	10.5	9.041 27	41	8.25	0.97	23	55.9
16	17	26	41.84	-19.05	-21	48	03.1	+10.5	9.041 68	- 72	8.25	0.97	23	51.7
17	17	26	22.79	19.01	21	47	52.6	10.5	9.042 40	101	8.25	0.97	23	47.4
18	17	26	03.78	18.97	21	47	42.1	10.4	9.043 41	131	8.25	0.97	23	43.2
19	17	25	44.81	18.93	21	47	31.7	10.3	9.044 72	161	8.24	0.97	23	39.0
20	17	25	25.88	18.87	21	47	21.4	10.3	9.046 33	191	8.24	0.97	23	34.7
21	17	25	07.01	-18.80	-21	47	11.1	+10.2	9.048 24	+221	8.24	0.97	23	30.5
22	17	24	48.21	18.72	21	47	00.9	10.1	9.050 45	250	8.24	0.97	23	26.2
23	17	24	29.49	18.62	21	46	50.8	10.0	9.052 95	279	8.24	0.97	23	22.0
24	17	24	10.87	18.54	21	46	40.8	9.9	9.055 74	309	8.23	0.97	23	17.7
25	17	23	52.33	18.42	21	46	30.9	9.8	9.058 83	338	8.23	0.97	23	13.5
26	17	23	33.91	-18.31	-21	46	21.1	+ 9.7	9.062 21	+367	8.23	0.97	23	09.3
27	17	23	15.60	18.19	21	46	11.4	9.5	9.065 88	396	8.22	0.97	23	05.0
28	17	22	57.41	18.05	21	46	01.9	9.4	9.069 84	425	8.22	0.97	23	00.8
29	17	22	39.36	17.91	21	45	52.5	9.2	9.074 09	453	8.22	0.97	22	56.6
30	17	22	21.45	17.75	21	45	43.3	9.1	9.078 62	481	8.21	0.97	22	52.3
July 1	17	22	03.70	-17.61	-21	45	34.2	+ 8.9	9.083 43	+509	8.21	0.97	22	48.1
2	17	21	46.09		-21	45	25.3		9.088 52		8.20	0.97	22	43.9

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME												Transit, Meridian of Green- wich			
Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax		
		h	m	s	s	°	'	"	"			"	"	h	m
July	1	17	22	03.70	-17.61	-21	45	34.2	+8.9	9.083 43	+ 509	8.21	0.97	22	43.9
	2	17	21	46.09	17.43	21	45	25.3	8.7	9.088 52	537	8.20	0.97	22	39.7
	3	17	21	28.66	17.26	21	45	16.6	8.5	9.093 89	566	8.20	0.97	22	35.4
	4	17	21	11.40	17.08	21	45	08.1	8.3	9.099 55	592	8.19	0.97	22	31.2
	5	17	20	54.32	16.89	21	44	59.8	8.1	9.105 47	621	8.19	0.97	22	27.0
	6	17	20	37.43	-16.70	-21	44	51.7	+7.9	9.111 68	+ 647	8.18	0.97	22	22.8
	7	17	20	20.73	16.48	21	44	43.8	7.7	9.118 15	675	8.18	0.97	22	18.6
	8	17	20	04.25	16.27	21	44	36.1	7.4	9.124 90	701	8.17	0.96	22	14.4
	9	17	19	47.98	16.05	21	44	28.7	7.2	9.131 91	728	8.17	0.96	22	10.2
	10	17	19	31.93	15.82	21	44	21.5	6.9	9.139 19	755	8.16	0.96	22	06.0
	11	17	19	16.11	-15.58	-21	44	14.6	+6.7	9.146 74	+ 781	8.15	0.96	22	01.8
	12	17	19	00.53	15.33	21	44	07.9	6.4	9.154 55	807	8.15	0.96	21	57.6
	13	17	18	45.20	15.08	21	44	01.5	6.1	9.162 62	832	8.14	0.96	21	53.4
	14	17	18	30.12	14.82	21	43	55.4	5.8	9.170 94	858	8.13	0.96	21	49.3
	15	17	18	15.30	14.54	21	43	49.6	5.5	9.179 52	883	8.12	0.96	21	45.1
	16	17	18	00.76	-14.28	-21	43	44.1	+5.2	9.188 35	+ 908	8.12	0.96	21	40.9
	17	17	17	46.48	13.98	21	43	38.9	4.9	9.197 43	932	8.11	0.96	21	36.8
	18	17	17	32.50	13.70	21	43	34.0	4.5	9.206 75	956	8.10	0.96	21	32.6
	19	17	17	18.80	13.40	21	43	29.5	4.3	9.216 31	981	8.09	0.95	21	28.5
	20	17	17	05.40	13.09	21	43	25.2	3.8	9.226 12	1003	8.08	0.95	21	24.3
	21	17	16	52.31	-12.78	-21	43	21.4	+3.5	9.236 15	+1027	8.07	0.95	21	20.2
	22	17	16	39.53	12.47	21	43	17.9	3.2	9.246 42	1049	8.06	0.95	21	16.0
	23	17	16	27.06	12.14	21	43	14.7	2.8	9.256 91	1072	8.05	0.95	21	11.9
	24	17	16	14.92	11.82	21	43	11.9	2.4	9.267 63	1094	8.05	0.95	21	07.8
	25	17	16	03.10	11.49	21	43	09.5	2.0	9.278 57	1115	8.04	0.95	21	03.6
	26	17	15	51.61	-11.15	-21	43	07.5	+1.6	9.289 72	+1136	8.03	0.95	20	59.5
	27	17	15	40.46	10.81	21	43	05.9	1.2	9.301 08	1157	8.02	0.95	20	55.4
	28	17	15	29.65	10.46	21	43	04.7	0.8	9.312 65	1177	8.01	0.94	20	51.3
	29	17	15	19.19	10.11	21	43	03.9	+0.3	9.324 42	1198	8.00	0.94	20	47.2
	30	17	15	09.08	9.77	21	43	03.6	0.0	9.336 40	1217	7.99	0.94	20	43.1
Aug.	31	17	14	59.31	- 9.40	-21	43	03.6	-0.5	9.348 57	+1236	7.98	0.94	20	39.0
	1	17	14	49.91	9.04	21	43	04.1	0.9	9.360 93	1256	7.97	0.94	20	34.9
	2	17	14	40.87	8.68	21	43	05.0	1.3	9.373 49	1274	7.96	0.94	20	30.9
	3	17	14	32.19	8.31	21	43	06.3	1.8	9.386 23	1292	7.94	0.94	20	26.8
	4	17	14	23.88	7.93	21	43	08.1	2.2	9.399 15	1310	7.93	0.94	20	22.7
	5	17	14	15.95	- 7.56	-21	43	10.3	-2.7	9.412 25	+1327	7.92	0.93	20	18.7
	6	17	14	08.39	7.18	21	43	13.0	3.1	9.425 52	1345	7.91	0.93	20	14.6
	7	17	14	01.21	6.79	21	43	16.1	3.6	9.438 97	1361	7.90	0.93	20	10.6
	8	17	13	54.42	6.40	21	43	19.7	4.0	9.452 58	1377	7.89	0.93	20	06.5
	9	17	13	48.02	6.02	21	43	23.7	4.5	9.466 35	1393	7.88	0.93	20	02.5
	10	17	13	42.00	- 5.62	-21	43	28.2	-5.0	9.480 28	+1409	7.87	0.93	19	58.5
	11	17	13	36.38	5.22	21	43	33.2	5.5	9.494 37	1424	7.85	0.93	19	54.5
	12	17	13	31.16	4.83	21	43	38.7	5.9	9.508 61	1438	7.84	0.93	19	50.4
	13	17	13	26.33	4.41	21	43	44.6	6.4	9.522 99	1452	7.83	0.92	19	46.4
	14	17	13	21.92	4.02	21	43	51.0	6.9	9.537 51	1466	7.82	0.92	19	42.4
	15	17	13	17.90	- 3.61	-21	43	57.9	-7.4	9.552 17	+1479	7.81	0.92	19	38.4
16	17	13	14.29		-21	44	05.3		9.566 96		7.79	0.92	19	34.5	

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	^s	°	'	"	"		"	"	h m	
Aug. 16	17	13	14.29		-21	44	05.3		9.566 96		7.79	0.92	19 34.5
17	17	13	11.10	- 3.19	21	44	13.1	- 7.8	9.581 88	+1492	7.78	0.92	19 30.5
18	17	13	08.32	2.78	21	44	21.4	8.3	9.596 92	1504	7.77	0.92	19 26.5
19	17	13	05.95	2.37	21	44	30.2	8.8	9.612 08	1516	7.76	0.92	19 22.5
20	17	13	03.99	1.96	21	44	39.5	9.3	9.627 35	1527	7.75	0.91	19 18.6
				1.54				9.8		1537			
21	17	13	02.45		-21	44	49.3		9.642 72		7.73	0.91	19 14.6
22	17	13	01.33	- 1.12	21	44	59.6	-10.3	9.658 20	+1548	7.72	0.91	19 10.7
23	17	13	00.62	0.71	21	45	10.3	10.7	9.673 78	1558	7.71	0.91	19 06.7
24	17	13	00.33	- 0.29	21	45	21.5	11.2	9.689 45	1567	7.70	0.91	19 02.8
25	17	13	00.45	+ 0.12	21	45	33.3	11.8	9.705 21	1576	7.68	0.91	18 58.9
				0.55				12.1		1584			
26	17	13	01.00		-21	45	45.4		9.721 05		7.67	0.91	18 55.0
27	17	13	01.95	+ 0.95	21	45	58.1	-12.7	9.736 97	+1592	7.66	0.90	18 51.1
28	17	13	03.33	1.38	21	46	11.2	13.1	9.752 97	1600	7.65	0.90	18 47.2
29	17	13	05.12	1.79	21	46	24.8	13.6	9.769 04	1607	7.63	0.90	18 43.3
30	17	13	07.32	2.20	21	46	38.8	14.0	9.785 17	1613	7.62	0.90	18 39.4
				2.63				14.5		1620			
31	17	13	09.95		-21	46	53.3		9.801 37		7.61	0.90	18 35.5
Sept. 1	17	13	12.98	+ 3.03	21	47	08.3	-15.0	9.817 62	+1625	7.60	0.90	18 31.6
2	17	13	16.44	3.46	21	47	23.8	15.5	9.833 93	1631	7.58	0.89	18 27.7
3	17	13	20.30	3.86	21	47	39.6	15.8	9.850 29	1636	7.57	0.89	18 23.9
4	17	13	24.58	4.28	21	47	55.9	16.3	9.866 70	1641	7.56	0.89	18 20.0
				4.70				16.8		1644			
5	17	13	29.28		-21	48	12.7		9.883 14		7.54	0.89	18 16.2
6	17	13	34.39	+ 5.11	21	48	29.9	-17.2	9.899 63	+1649	7.53	0.89	18 12.3
7	17	13	39.92	5.53	21	48	47.5	17.6	9.916 14	1651	7.52	0.89	18 08.5
8	17	13	45.85	5.93	21	49	05.5	18.0	9.932 68	1654	7.51	0.89	18 04.7
9	17	13	52.20	6.35	21	49	24.0	18.5	9.949 25	1657	7.49	0.88	18 00.8
				6.76				18.8		1658			
10	17	13	58.96		-21	49	42.8		9.965 83		7.48	0.88	17 57.0
11	17	14	06.13	+ 7.17	21	50	02.0	-19.2	9.982 43	+1660	7.47	0.88	17 53.2
12	17	14	13.71	7.58	21	50	21.7	19.7	9.999 03	1660	7.46	0.88	17 49.4
13	17	14	21.69	7.98	21	50	41.7	20.0	10.015 64	1661	7.45	0.88	17 45.6
14	17	14	30.09	8.40	21	51	02.1	20.4	10.032 25	1661	7.43	0.88	17 41.8
				8.80				20.8		1660			
15	17	14	38.89		-21	51	22.9		10.048 85		7.42	0.88	17 38.1
16	17	14	48.09	+ 9.20	21	51	44.1	-21.2	10.065 45	+1660	7.41	0.87	17 34.3
17	17	14	57.69	9.60	21	52	05.6	21.5	10.082 02	1657	7.40	0.87	17 30.5
18	17	15	07.69	10.00	21	52	27.4	21.8	10.098 58	1656	7.38	0.87	17 26.8
19	17	15	18.09	10.40	21	52	49.6	22.2	10.115 11	1653	7.37	0.87	17 23.0
				10.78				22.6		1650			
20	17	15	28.87		-21	53	12.2		10.131 61		7.36	0.87	17 19.3
21	17	15	40.05	+11.18	21	53	35.0	-22.8	10.148 08	+1647	7.35	0.87	17 15.5
22	17	15	51.61	11.56	21	53	58.1	23.1	10.164 50	1642	7.34	0.87	17 11.8
23	17	16	03.56	11.95	21	54	21.6	23.5	10.180 89	1639	7.32	0.86	17 08.0
24	17	16	15.89	12.33	21	54	45.4	23.8	10.197 23	1634	7.31	0.86	17 04.3
				12.70				24.0		1629			
25	17	16	28.59		-21	55	09.4		10.213 52		7.30	0.86	17 00.6
26	17	16	41.68	+13.09	21	55	33.8	-24.4	10.229 76	+1624	7.29	0.86	16 56.9
27	17	16	55.13	13.45	21	55	58.3	24.5	10.245 93	1617	7.28	0.86	16 53.2
28	17	17	08.95	13.82	21	56	23.2	24.9	10.262 05	1612	7.27	0.86	16 49.5
29	17	17	23.14	14.19	21	56	48.2	25.0	10.278 10	1605	7.26	0.86	16 45.8
				14.56				25.3		1598			
30	17	17	37.70		-21	57	13.5		10.294 08		7.24	0.85	16 42.1
Oct. 1	17	17	52.61	+14.91	-21	57	39.1	-25.6	10.309 98	+1590	7.23	0.85	16 38.4

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi-diameter	Hor. Parallax	Transit, Meridian of Greenwich		
		h	m	s	s	°	'	"	"			"	"	h	m	
Oct.	1	17	17	52.61	+15.27	-21	57	39.1	-25.7	10.309	98	+1583	7.23	0.85	16	38.4
	2	17	18	07.88	15.63	21	58	04.8	25.9	10.325	81	1575	7.22	0.85	16	34.8
	3	17	18	23.51	15.98	21	58	30.7	26.1	10.341	56	1566	7.21	0.85	16	31.1
	4	17	18	39.49	16.33	21	58	56.8	26.3	10.357	22	1557	7.20	0.85	16	27.4
	5	17	18	55.82	16.69	21	59	23.1	26.5	10.372	79	1548	7.19	0.85	16	23.8
	6	17	19	12.51	+17.02	-21	59	49.6	-26.6	10.388	27	+1539	7.18	0.85	16	20.1
	7	17	19	29.53	17.36	22	00	16.2	26.8	10.403	66	1527	7.17	0.85	16	16.5
	8	17	19	46.89	17.70	22	00	43.0	26.9	10.418	93	1518	7.16	0.84	16	12.8
	9	17	20	04.59	18.04	22	01	09.9	27.0	10.434	11	1507	7.15	0.84	16	09.2
	10	17	20	22.63	18.37	22	01	36.9	27.1	10.449	18	1495	7.14	0.84	16	05.6
	11	17	20	41.00	+18.70	-22	02	04.0	-27.2	10.464	13	+1483	7.13	0.84	16	02.0
	12	17	20	59.70	19.02	22	02	31.2	27.4	10.478	96	1472	7.12	0.84	15	58.3
	13	17	21	18.72	19.35	22	02	58.6	27.3	10.493	68	1458	7.11	0.84	15	54.7
	14	17	21	38.07	19.66	22	03	25.9	27.5	10.508	26	1446	7.10	0.84	15	51.1
	15	17	21	57.73	19.97	22	03	53.4	27.5	10.522	72	1432	7.09	0.84	15	47.5
	16	17	22	17.70	+20.28	-22	04	20.9	-27.6	10.537	04	+1418	7.08	0.84	15	43.9
	17	17	22	37.98	20.58	22	04	48.5	27.5	10.551	22	1405	7.07	0.83	15	40.3
	18	17	22	58.56	20.89	22	05	16.0	27.6	10.565	27	1389	7.06	0.83	15	36.7
	19	17	23	19.45	21.17	22	05	43.6	27.7	10.579	16	1375	7.05	0.83	15	33.2
	20	17	23	40.62	21.47	22	06	11.3	27.5	10.592	91	1360	7.04	0.83	15	29.6
	21	17	24	02.09	+21.75	-22	06	38.8	-27.6	10.606	51	+1345	7.03	0.83	15	26.0
	22	17	24	23.84	22.04	22	07	06.4	27.6	10.619	96	1329	7.02	0.83	15	22.4
	23	17	24	45.88	22.31	22	07	34.0	27.5	10.633	25	1312	7.01	0.83	15	18.9
	24	17	25	08.19	22.58	22	08	01.5	27.5	10.646	37	1297	7.00	0.83	15	15.3
	25	17	25	30.77	22.86	22	08	29.0	27.4	10.659	34	1280	7.00	0.83	15	11.8
	26	17	25	53.63	+23.12	-22	08	56.4	-27.3	10.672	14	+1263	6.99	0.82	15	08.2
	27	17	26	16.75	23.38	22	09	23.7	27.3	10.684	77	1245	6.98	0.82	15	04.7
	28	17	26	40.13	23.63	22	09	51.0	27.1	10.697	22	1229	6.97	0.82	15	01.1
	29	17	27	03.76	23.89	22	10	18.1	27.1	10.709	51	1210	6.96	0.82	14	57.6
	30	17	27	27.65	24.14	22	10	45.2	26.9	10.721	61	1193	6.96	0.82	14	54.0
	31	17	27	51.79	+24.38	-22	11	12.1	-26.8	10.733	54	+1174	6.95	0.82	14	50.5
Nov.	1	17	28	16.17	24.62	22	11	38.9	26.6	10.745	28	1156	6.94	0.82	14	47.0
	2	17	28	40.79	24.87	22	12	05.5	26.5	10.756	84	1137	6.93	0.82	14	43.5
	3	17	29	05.66	25.09	22	12	32.0	26.4	10.768	21	1117	6.93	0.82	14	40.0
	4	17	29	30.75	25.32	22	12	58.4	26.1	10.779	38	1099	6.92	0.82	14	36.4
	5	17	29	56.07	+25.55	-22	13	24.5	-26.0	10.790	37	+1078	6.91	0.82	14	32.9
	6	17	30	21.62	25.77	22	13	50.5	25.8	10.801	15	1059	6.90	0.81	14	29.4
	7	17	30	47.39	25.98	22	14	16.3	25.6	10.811	74	1038	6.90	0.81	14	25.9
	8	17	31	13.37	26.20	22	14	41.9	25.4	10.822	12	1017	6.89	0.81	14	22.4
	9	17	31	39.57	26.40	22	15	07.3	25.1	10.832	29	997	6.88	0.81	14	18.9
	10	17	32	05.97	+26.61	-22	15	32.4	-24.9	10.842	26	+975	6.88	0.81	14	15.4
	11	17	32	32.58	26.81	22	15	57.3	24.7	10.852	01	954	6.87	0.81	14	11.9
	12	17	32	59.39	26.99	22	16	22.0	24.4	10.861	55	932	6.87	0.81	14	08.5
	13	17	33	26.38	27.18	22	16	46.4	24.2	10.870	87	911	6.86	0.81	14	05.0
	14	17	33	53.56	27.37	22	17	10.6	23.9	10.879	98	888	6.85	0.81	14	01.5
	15	17	34	20.93	+27.54	-22	17	34.5	-23.6	10.888	86	+865	6.85	0.81	13	58.0
	16	17	34	48.47		-22	17	58.1		10.897	51		6.84	0.81	13	54.6

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Polar Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	s	°	'	"	"			"	"	h m
Nov. 16	17	34	48.47	+27.71	-22	17	58.1	-23.4	10.897 51	+844	6.84	0.81	13 54.6
17	17	35	16.18	27.88	22	18	21.5	23.0	10.905 95	820	6.84	0.81	13 51.1
18	17	35	44.06	28.04	22	18	44.5	22.8	10.914 15	797	6.83	0.81	13 47.6
19	17	36	12.10	28.20	22	19	07.3	22.4	10.922 12	774	6.83	0.81	13 44.1
20	17	36	40.30	28.35	22	19	29.7	22.1	10.929 86	752	6.82	0.81	13 40.7
21	17	37	08.65	+28.49	-22	19	51.8	-21.8	10.937 38	+727	6.82	0.80	13 37.2
22	17	37	37.14	28.64	22	20	13.6	21.5	10.944 65	704	6.81	0.80	13 33.8
23	17	38	05.78	28.77	22	20	35.1	21.1	10.951 69	681	6.81	0.80	13 30.3
24	17	38	34.55	28.91	22	20	56.2	20.8	10.958 50	657	6.80	0.80	13 26.9
25	17	39	03.46	29.03	22	21	17.0	20.4	10.965 07	632	6.80	0.80	13 23.4
26	17	39	32.49	+29.16	-22	21	37.4	-20.0	10.971 39	+609	6.80	0.80	13 20.0
27	17	40	01.65	29.27	22	21	57.4	19.7	10.977 48	584	6.79	0.80	13 16.5
28	17	40	30.92	29.40	22	22	17.1	19.3	10.983 32	560	6.79	0.80	13 13.1
29	17	41	00.32	29.50	22	22	36.4	18.9	10.988 92	536	6.79	0.80	13 09.6
30	17	41	29.82	29.60	22	22	55.3	18.5	10.994 28	511	6.78	0.80	13 06.2
Dec. 1	17	41	59.42	+29.71	-22	23	13.8	-18.1	10.999 39	+486	6.78	0.80	13 02.7
2	17	42	29.13	29.81	22	23	31.9	17.7	11.004 25	461	6.78	0.80	12 59.3
3	17	42	58.94	29.89	22	23	49.6	17.3	11.008 86	436	6.77	0.80	12 55.9
4	17	43	28.83	29.99	22	24	06.9	16.9	11.013 22	411	6.77	0.80	12 52.4
5	17	43	58.82	30.06	22	24	23.8	16.5	11.017 33	385	6.77	0.80	12 49.0
6	17	44	28.88	+30.15	-22	24	40.3	-16.1	11.021 18	+360	6.77	0.80	12 45.6
7	17	44	59.03	30.21	22	24	56.4	15.6	11.024 78	334	6.76	0.80	12 42.1
8	17	45	29.24	30.28	22	25	12.0	15.3	11.028 12	309	6.76	0.80	12 38.7
9	17	45	59.52	30.35	22	25	27.3	14.8	11.031 21	282	6.76	0.80	12 35.3
10	17	46	29.87	30.40	22	25	42.1	14.3	11.034 03	257	6.76	0.80	12 31.8
11	17	47	00.27	+30.45	-22	25	56.4	-13.9	11.036 60	+231	6.76	0.80	12 28.4
12	17	47	30.72	30.49	22	26	10.3	13.5	11.038 91	204	6.76	0.80	12 25.0
13	17	48	01.21	30.54	22	26	23.8	13.1	11.040 95	179	6.75	0.80	12 21.6
14	17	48	31.75	30.57	22	26	36.9	12.6	11.042 74	152	6.75	0.80	12 18.1
15	17	49	02.32	30.59	22	26	49.5	12.1	11.044 26	126	6.75	0.80	12 14.7
16	17	49	32.91	+30.62	-22	27	01.6	-11.7	11.045 52	+100	6.75	0.80	12 11.3
17	17	50	03.53	30.64	22	27	13.3	11.3	11.046 52	74	6.75	0.80	12 07.9
18	17	50	34.17	30.65	22	27	24.6	10.7	11.047 26	48	6.75	0.80	12 04.4
19	17	51	04.82	30.65	22	27	35.3	10.4	11.047 74	+ 22	6.75	0.80	12 01.0
20	17	51	35.47	30.66	22	27	45.7	9.9	11.047 96	- 5	6.75	0.80	11 57.6
21	17	52	06.13	+30.66	-22	27	55.6	- 9.4	11.047 91	- 31	6.75	0.80	11 54.2
22	17	52	36.79	30.65	22	28	05.0	8.9	11.047 60	56	6.75	0.80	11 50.7
23	17	53	07.44	30.64	22	28	13.9	8.5	11.047 04	83	6.75	0.80	11 47.3
24	17	53	38.08	30.62	22	28	22.4	8.1	11.046 21	109	6.75	0.80	11 43.9
25	17	54	08.70	30.60	22	28	30.5	7.6	11.045 12	135	6.75	0.80	11 40.5
26	17	54	39.30	+30.57	-22	28	38.1	- 7.1	11.043 77	-160	6.75	0.80	11 37.0
27	17	55	09.87	30.55	22	28	45.2	6.7	11.042 17	187	6.75	0.80	11 33.6
28	17	55	40.42	30.51	22	28	51.9	6.2	11.040 30	213	6.75	0.80	11 30.2
29	17	56	10.93	30.47	22	28	58.1	5.7	11.038 17	238	6.76	0.80	11 26.8
30	17	56	41.40	30.42	22	29	03.8	5.3	11.035 79	264	6.76	0.80	11 23.3
31	17	57	11.82	+30.38	-22	29	09.1	- 4.9	11.033 15	-290	6.76	0.80	11 19.9
32	17	57	42.20		-22	29	14.0		11.030 25		6.76	0.80	11 16.5

SATURN, 1958
FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	" "	' "	° ' "	"		
Jan.	5	257 35 16.4	1 48.75	-1 32.4	+1 27 08.5	-3.83	1.001 9768	+35.1
	13	257 49 46.3	1 48.74	1 32.1	1 26 37.8	3.85	1.002 0046	34.4
	21	258 04 16.2	1 48.73	1 31.8	1 26 07.1	3.86	1.002 0319	34.0
	29	258 18 46.0	1 48.71	1 31.6	1 25 36.2	3.87	1.002 0589	33.4
Feb.	6	258 33 15.6	1 48.70	1 31.3	1 25 05.2	3.88	1.002 0854	32.8
	14	258 47 45.2	1 48.69	-1 31.0	+1 24 34.2	-3.89	1.002 1115	+32.3
	22	259 02 14.7	1 48.67	1 30.7	1 24 03.0	3.90	1.002 1371	31.7
Mar.	2	259 16 44.0	1 48.66	1 30.4	1 23 31.8	3.91	1.002 1623	31.3
	10	259 31 13.3	1 48.65	1 30.1	1 23 00.5	3.92	1.002 1871	30.7
	18	259 45 42.4	1 48.64	1 29.8	1 22 29.1	3.93	1.002 2114	30.2
	26	260 00 11.5	1 48.63	-1 29.4	+1 21 57.6	-3.94	1.002 2354	+29.7
Apr.	3	260 14 40.5	1 48.62	1 29.1	1 21 26.1	3.95	1.002 2589	29.1
	11	260 29 09.4	1 48.61	1 28.8	1 20 54.4	3.96	1.002 2820	28.7
	19	260 43 38.2	1 48.59	1 28.4	1 20 22.7	3.97	1.002 3047	28.0
	27	260 58 06.9	1 48.58	1 28.1	1 19 50.9	3.98	1.002 3269	27.4
May	5	261 12 35.5	1 48.57	-1 27.7	+1 19 19.0	-3.99	1.002 3486	+26.9
	13	261 27 04.1	1 48.56	1 27.4	1 18 47.0	4.00	1.002 3700	26.4
	21	261 41 32.5	1 48.55	1 27.0	1 18 15.0	4.01	1.002 3909	25.8
	29	261 56 00.9	1 48.54	1 26.6	1 17 42.8	4.02	1.002 4114	25.3
June	6	262 10 29.2	1 48.53	1 26.3	1 17 10.6	4.03	1.002 4314	24.7
	14	262 24 57.4	1 48.52	-1 25.9	+1 16 38.3	-4.04	1.002 4509	+24.2
	22	262 39 25.5	1 48.51	1 25.5	1 16 06.0	4.05	1.002 4701	23.6
	30	262 53 53.6	1 48.50	1 25.1	1 15 33.5	4.06	1.002 4887	23.0
July	8	263 08 21.6	1 48.49	1 24.7	1 15 01.0	4.07	1.002 5069	22.6
	16	263 22 49.5	1 48.49	1 24.3	1 14 28.4	4.08	1.002 5248	22.0
	24	263 37 17.3	1 48.47	-1 23.9	+1 13 55.7	-4.09	1.002 5421	+21.4
Aug.	1	263 51 45.1	1 48.46	1 23.4	1 13 23.0	4.10	1.002 5591	20.9
	9	264 06 12.8	1 48.46	1 23.0	1 12 50.2	4.11	1.002 5756	20.4
	17	264 20 40.4	1 48.45	1 22.6	1 12 17.3	4.12	1.002 5917	19.8
	25	264 35 08.0	1 48.44	1 22.1	1 11 44.3	4.13	1.002 6073	19.3
Sept.	2	264 49 35.5	1 48.43	-1 21.7	+1 11 11.2	-4.14	1.002 6226	+18.8
	10	265 04 03.0	1 48.43	1 21.2	1 10 38.1	4.15	1.002 6373	18.1
	18	265 18 30.3	1 48.42	1 20.8	1 10 04.9	4.15	1.002 6516	17.6
	26	265 32 57.7	1 48.41	1 20.3	1 09 31.7	4.16	1.002 6654	17.1
Oct.	4	265 47 25.0	1 48.41	1 19.9	1 08 58.3	4.17	1.002 6790	16.6
	12	266 01 52.2	1 48.40	-1 19.4	+1 08 24.9	-4.18	1.002 6920	+15.9
	20	266 16 19.4	1 48.39	1 18.9	1 07 51.4	4.19	1.002 7045	15.3
	28	266 30 46.5	1 48.39	1 18.4	1 07 17.9	4.20	1.002 7166	15.0
Nov.	5	266 45 13.6	1 48.38	1 17.9	1 06 44.3	4.21	1.002 7284	14.3
	13	266 59 40.6	1 48.38	1 17.5	1 06 10.6	4.22	1.002 7396	13.6
	21	267 14 07.6	1 48.37	-1 16.9	+1 05 36.8	-4.22	1.002 7503	+13.1
Dec.	29	267 28 34.6	1 48.37	1 16.4	1 05 03.0	4.23	1.002 7607	12.7
	7	267 43 01.5	1 48.36	1 15.9	1 04 29.1	4.24	1.002 7706	12.0
	15	267 57 28.3	1 48.36	1 15.4	1 03 55.1	4.25	1.002 7800	11.6
	23	268 11 55.2	1 48.35	1 14.9	1 03 21.1	4.26	1.002 7891	11.0
	31	268 26 22.0	1 48.35	-1 14.4	+1 02 47.0	-4.27	1.002 7976	+10.3
	39	268 40 48.8	1 48.35	-1 13.8	+1 02 12.9	-4.27	1.002 8057	+ 9.7

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s		°	'	"						
Jan.	0	8 53	57.69	s	+18 09	22.5	"		17.647 17		1.94	0.50	h m
	1	8 53	49.16	- 8.53	18 09	58.7	+36.2		17.638 10	-907	1.94	0.50	2 17.0
	2	8 53	40.49	8.67	18 10	35.5	36.8		17.629 29	881	1.94	0.50	2 12.9
	3	8 53	31.70	8.79	18 11	12.7	37.2		17.620 77	852	1.94	0.50	2 08.8
	4	8 53	22.77	8.93	18 11	50.3	37.6		17.612 51	826	1.95	0.50	2 04.7
				9.04			38.1			798	1.95	0.50	2 00.6
	5	8 53	13.73	- 9.16	+18 12	28.4	+38.5		17.604 53	-771	1.95	0.50	1 56.6
	6	8 53	04.57	9.26	18 13	06.9	38.8		17.596 82	742	1.95	0.50	1 52.5
	7	8 52	55.31	9.39	18 13	45.7	39.3		17.589 40	714	1.95	0.50	1 48.4
	8	8 52	45.92	9.48	18 14	25.0	39.6		17.582 26	685	1.95	0.50	1 44.3
	9	8 52	36.44	9.59	18 15	04.6	39.8		17.575 41	656	1.95	0.50	1 40.2
	10	8 52	26.85	- 9.69	+18 15	44.4	+40.4		17.568 85	-627	1.95	0.50	1 36.1
	11	8 52	17.16	9.78	18 16	24.8	40.4		17.562 58	597	1.95	0.50	1 32.0
	12	8 52	07.38	9.87	18 17	05.2	40.9		17.556 61	569	1.95	0.50	1 27.9
	13	8 51	57.51	9.96	18 17	46.1	41.0		17.550 92	537	1.95	0.50	1 23.8
	14	8 51	47.55	10.03	18 18	27.1	41.5		17.545 55	508	1.95	0.50	1 19.8
	15	8 51	37.52	-10.12	+18 19	08.6	+41.5		17.540 47	-478	1.95	0.50	1 15.7
	16	8 51	27.40	10.18	18 19	50.1	41.8		17.535 69	448	1.95	0.50	1 11.6
	17	8 51	17.22	10.25	18 20	31.9	41.9		17.531 21	416	1.96	0.50	1 07.5
	18	8 51	06.97	10.31	18 21	13.8	42.1		17.527 05	385	1.96	0.50	1 03.4
	19	8 50	56.66	10.38	18 21	55.9	42.3		17.523 20	356	1.96	0.50	0 59.2
Feb.	20	8 50	46.28	-10.42	+18 22	38.2	+42.4		17.519 64	-324	1.96	0.50	0 55.1
	21	8 50	35.86	10.46	18 23	20.6	42.5		17.516 40	292	1.96	0.50	0 51.0
	22	8 50	25.40	10.52	18 24	03.1	42.7		17.513 48	261	1.96	0.50	0 46.9
	23	8 50	14.88	10.55	18 24	45.8	42.5		17.510 87	230	1.96	0.50	0 42.8
	24	8 50	04.33	10.58	18 25	28.3	42.7		17.508 57	199	1.96	0.50	0 38.7
	25	8 49	53.75	-10.60	+18 26	11.0	+42.7		17.506 58	-167	1.96	0.50	0 34.6
	26	8 49	43.15	10.63	18 26	53.7	42.6		17.504 91	136	1.96	0.50	0 30.5
	27	8 49	32.52	10.64	18 27	36.3	42.7		17.503 55	104	1.96	0.50	0 26.4
	28	8 49	21.88	10.66	18 28	19.0	42.7		17.502 51	73	1.96	0.50	0 22.3
	29	8 49	11.22	10.66	18 29	01.7	42.5		17.501 78	41	1.96	0.50	0 18.2
	30	8 49	00.56	-10.67	+18 29	44.2	+42.5		17.501 37	- 11	1.96	0.50	0 14.1
	31	8 48	49.89	10.66	18 30	26.7	42.4		17.501 26	+ 21	1.96	0.50	0 10.0
	1	8 48	39.23	10.65	18 31	09.1	42.3		17.501 47	53	1.96	0.50	0 05.9
	2	8 48	28.58	10.65	18 31	51.4	42.1		17.502 00	84	1.96	0.50	{ 0 01.7 23 57.6
	3	8 48	17.93	10.62	18 32	33.5	41.9		17.502 84	114	1.96	0.50	23 53.5
	4	8 48	07.31	-10.61	+18 33	15.4	+41.9		17.503 98	+146	1.96	0.50	23 49.4
	5	8 47	56.70	10.57	18 33	57.3	41.6		17.505 44	177	1.96	0.50	23 45.3
	6	8 47	46.13	10.56	18 34	38.9	41.5		17.507 21	208	1.96	0.50	23 41.2
	7	8 47	35.57	10.51	18 35	20.4	41.1		17.509 29	239	1.96	0.50	23 37.1
	8	8 47	25.06	10.48	18 36	01.5	41.1		17.511 68	269	1.96	0.50	23 33.0
	9	8 47	14.58	-10.43	+18 36	42.6	+40.7		17.514 37	+300	1.96	0.50	23 28.9
	10	8 47	04.15	10.39	18 37	23.3	40.4		17.517 37	331	1.96	0.50	23 24.8
	11	8 46	53.76	10.32	18 38	03.7	40.2		17.520 68	362	1.96	0.50	23 20.7
	12	8 46	43.44	10.28	18 38	43.9	39.9		17.524 30	391	1.96	0.50	23 16.6
	13	8 46	33.16	10.21	18 39	23.8	39.5		17.528 21	423	1.96	0.50	23 12.5
	14	8 46	22.95	-10.14	+18 40	03.3	+39.2		17.532 44	+451	1.96	0.50	23 08.4
	15	8 46	12.81		+18 40	42.5			17.536 95		1.95	0.50	23 04.3

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Meridian of Green- wich	
	h	m	s	s	°	'	"	"				h	m
Feb. 15	8	46	12.81	-10.07	+18	40	42.5	+38.8	17.536 95	+ 483	1.95	0.50	23 04.3
16	8	46	02.74	9.99	18	41	21.3	38.4	17.541 78	511	1.95	0.50	23 00.2
17	8	45	52.75	9.91	18	41	59.7	38.0	17.546 89	542	1.95	0.50	22 56.1
18	8	45	42.84	9.83	18	42	37.7	37.7	17.552 31	571	1.95	0.50	22 52.0
19	8	45	33.01	9.73	18	43	15.4	37.1	17.558 02	601	1.95	0.50	22 47.9
20	8	45	23.28	-9.64	+18	43	52.5	+36.7	17.564 03	+ 629	1.95	0.50	22 43.8
21	8	45	13.64	9.53	18	44	29.2	36.3	17.570 32	658	1.95	0.50	22 39.7
22	8	45	04.11	9.43	18	45	05.5	35.8	17.576 90	685	1.95	0.50	22 35.6
23	8	44	54.68	9.32	18	45	41.3	35.3	17.583 75	715	1.95	0.50	22 31.5
24	8	44	45.36	9.21	18	46	16.6	34.9	17.590 90	741	1.95	0.50	22 27.5
25	8	44	36.15	-9.09	+18	46	51.5	+34.2	17.598 31	+ 770	1.95	0.50	22 23.4
26	8	44	27.06	8.97	18	47	25.7	33.8	17.606 01	796	1.95	0.50	22 19.3
27	8	44	18.09	8.85	18	47	59.5	33.1	17.613 97	824	1.95	0.50	22 15.2
28	8	44	09.24	8.71	18	48	32.6	32.7	17.622 21	850	1.95	0.50	22 11.1
Mar. 1	8	44	00.53	8.59	18	49	05.3	32.0	17.630 71	875	1.94	0.50	22 07.1
2	8	43	51.94	-8.44	+18	49	37.3	+31.5	17.639 46	+ 903	1.94	0.50	22 03.0
3	8	43	43.50	8.31	18	50	08.8	30.9	17.648 49	926	1.94	0.50	21 58.9
4	8	43	35.19	8.17	18	50	39.7	30.2	17.657 75	953	1.94	0.50	21 54.9
5	8	43	27.02	8.01	18	51	09.9	29.7	17.667 28	977	1.94	0.50	21 50.8
6	8	43	19.01	7.88	18	51	39.6	29.0	17.677 05	1001	1.94	0.50	21 46.7
7	8	43	11.13	-7.72	+18	52	08.6	+28.5	17.687 06	+1026	1.94	0.50	21 42.7
8	8	43	03.41	7.56	18	52	37.1	27.7	17.697 32	1049	1.94	0.50	21 38.6
9	8	42	55.85	7.40	18	53	04.8	27.1	17.707 81	1073	1.94	0.50	21 34.6
10	8	42	48.45	7.25	18	53	31.9	26.4	17.718 54	1096	1.93	0.50	21 30.5
11	8	42	41.20	7.08	18	53	58.3	25.8	17.729 50	1119	1.93	0.50	21 26.5
12	8	42	34.12	-6.91	+18	54	24.1	+25.0	17.740 69	+1141	1.93	0.50	21 22.4
13	8	42	27.21	6.75	18	54	49.1	24.4	17.752 10	1163	1.93	0.50	21 18.4
14	8	42	20.46	6.56	18	55	13.5	23.6	17.763 73	1185	1.93	0.50	21 14.3
15	8	42	13.90	6.39	18	55	37.1	23.0	17.775 58	1206	1.93	0.50	21 10.3
16	8	42	07.51	6.22	18	56	00.1	22.2	17.787 64	1227	1.93	0.49	21 06.3
17	8	42	01.29	-6.03	+18	56	22.3	+21.5	17.799 91	+1247	1.93	0.49	21 02.2
18	8	41	55.26	5.84	18	56	43.8	20.7	17.812 38	1267	1.92	0.49	20 58.2
19	8	41	49.42	5.66	18	57	04.5	20.0	17.825 05	1287	1.92	0.49	20 54.2
20	8	41	43.76	5.46	18	57	24.5	19.2	17.837 92	1305	1.92	0.49	20 50.1
21	8	41	38.30	5.28	18	57	43.7	18.4	17.850 97	1325	1.92	0.49	20 46.1
22	8	41	33.02	5.07	+18	58	02.1	+17.7	17.864 22	+1343	1.92	0.49	20 42.1
23	8	41	27.95	4.89	18	58	19.8	16.9	17.877 65	1360	1.92	0.49	20 38.1
24	8	41	23.06	4.67	18	58	36.7	16.2	17.891 25	1377	1.92	0.49	20 34.1
25	8	41	18.39	4.48	18	58	52.9	15.3	17.905 02	1394	1.91	0.49	20 30.1
26	8	41	13.91	4.28	18	59	08.2	14.5	17.918 96	1410	1.91	0.49	20 26.1
27	8	41	09.63	-4.07	+18	59	22.7	+13.8	17.933 06	+1426	1.91	0.49	20 22.1
28	8	41	05.56	3.87	18	59	36.5	12.9	17.947 32	1441	1.91	0.49	20 18.1
29	8	41	01.69	3.65	18	59	49.4	12.1	17.961 73	1455	1.91	0.49	20 14.1
30	8	40	58.04	3.46	19	00	01.5	11.3	17.976 28	1470	1.91	0.49	20 10.1
31	8	40	54.58	3.24	19	00	12.8	10.5	17.990 98	1483	1.91	0.49	20 06.1
Apr. 1	8	40	51.34	-3.03	+19	00	23.3	+ 9.7	18.005 81	+1497	1.90	0.49	20 02.1
2	8	40	48.31		+19	00	33.0		18.020 78		1.90	0.49	19 58.2

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi-diameter	Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s	s	°	'	"	"					h	m
Apr. 1	8	40	51.34	-3.03	+19	00	23.3	+ 9.7	18.005 81	+1497	1.90	0.49	20	02.1
2	8	40	48.31	2.82	19	00	33.0	9.0	18.020 78	1509	1.90	0.49	19	58.2
3	8	40	45.49	2.60	19	00	42.0	8.0	18.035 87	1522	1.90	0.49	19	54.2
4	8	40	42.89	2.40	19	00	50.0	7.2	18.051 09	1533	1.90	0.49	19	50.2
5	8	40	40.49	2.18	19	00	57.2	6.5	18.066 42	1544	1.90	0.49	19	46.2
6	8	40	38.31	-1.96	+19	01	03.7	+ 5.6	18.081 86	+1557	1.90	0.49	19	42.3
7	8	40	36.35	1.75	19	01	09.3	4.9	18.097 43	1566	1.89	0.49	19	38.3
8	8	40	34.60	1.53	19	01	14.2	3.9	18.113 09	1577	1.89	0.49	19	34.4
9	8	40	33.07	1.32	19	01	18.1	3.1	18.128 86	1585	1.89	0.49	19	30.4
10	8	40	31.75	1.10	19	01	21.2	2.3	18.144 71	1596	1.89	0.48	19	26.4
11	8	40	30.65	-0.87	+19	01	23.5	+ 1.5	18.160 67	+1604	1.89	0.48	19	22.5
12	8	40	29.78	0.66	19	01	25.0	+ 0.7	18.176 71	1612	1.89	0.48	19	18.6
13	8	40	29.12	0.44	19	01	25.7	- 0.3	18.192 83	1619	1.88	0.48	19	14.6
14	8	40	28.68	-0.21	19	01	25.4	1.0	18.209 02	1627	1.88	0.48	19	10.7
15	8	40	28.47	0.00	19	01	24.4	1.9	18.225 29	1634	1.88	0.48	19	06.7
16	8	40	28.47	+0.23	+19	01	22.5	- 2.8	18.241 63	+1639	1.88	0.48	19	02.8
17	8	40	28.70	0.45	19	01	19.7	3.6	18.258 02	1646	1.88	0.48	18	58.9
18	8	40	29.15	0.66	19	01	16.1	4.4	18.274 48	1650	1.88	0.48	18	55.0
19	8	40	29.81	0.90	19	01	11.7	5.2	18.290 98	1656	1.87	0.48	18	51.1
20	8	40	30.71	1.12	19	01	06.5	6.1	18.307 54	1658	1.87	0.48	18	47.1
21	8	40	31.83	+1.34	+19	01	00.4	- 7.0	18.324 12	+1663	1.87	0.48	18	43.2
22	8	40	33.17	1.55	19	00	53.4	7.7	18.340 75	1665	1.87	0.48	18	39.3
23	8	40	34.72	1.78	19	00	45.7	8.6	18.357 40	1668	1.87	0.48	18	35.4
24	8	40	36.50	2.01	19	00	37.1	9.4	18.374 08	1671	1.87	0.48	18	31.5
25	8	40	38.51	2.22	19	00	27.7	10.3	18.390 79	1672	1.86	0.48	18	27.6
26	8	40	40.73	+2.43	+19	00	17.4	-11.0	18.407 51	+1672	1.86	0.48	18	23.7
27	8	40	43.16	2.66	19	00	06.4	11.9	18.424 23	1673	1.86	0.48	18	19.8
28	8	40	45.82	2.88	18	59	54.5	12.8	18.440 96	1673	1.86	0.48	18	16.0
29	8	40	48.70	3.08	18	59	41.7	13.4	18.457 69	1673	1.86	0.48	18	12.1
30	8	40	51.78	3.31	18	59	28.3	14.4	18.474 42	1672	1.86	0.48	18	08.2
May 1	8	40	55.09	+3.53	+18	59	13.9	-15.1	18.491 14	+1670	1.85	0.48	18	04.3
2	8	40	58.62	3.73	18	58	58.8	15.9	18.507 84	1669	1.85	0.48	18	00.5
3	8	41	02.35	3.94	18	58	42.9	16.8	18.524 53	1666	1.85	0.48	17	56.6
4	8	41	06.29	4.16	18	58	26.1	17.5	18.541 19	1664	1.85	0.47	17	52.7
5	8	41	10.45	4.36	18	58	08.6	18.3	18.557 83	1660	1.85	0.47	17	48.9
6	8	41	14.81	+4.58	+18	57	50.3	-19.1	18.574 43	+1658	1.85	0.47	17	45.0
7	8	41	19.39	4.78	18	57	31.2	20.0	18.591 01	1654	1.84	0.47	17	41.2
8	8	41	24.17	4.99	18	57	11.2	20.7	18.607 55	1648	1.84	0.47	17	37.3
9	8	41	29.16	5.20	18	56	50.5	21.4	18.624 03	1646	1.84	0.47	17	33.5
10	8	41	34.36	5.40	18	56	29.1	22.3	18.640 49	1638	1.84	0.47	17	29.6
11	8	41	39.76	+5.60	+18	56	06.8	-23.0	18.656 87	+1634	1.84	0.47	17	25.8
12	8	41	45.36	5.81	18	55	43.8	23.8	18.673 21	1628	1.84	0.47	17	21.9
13	8	41	51.17	6.01	18	55	20.0	24.5	18.689 49	1621	1.83	0.47	17	18.1
14	8	41	57.18	6.21	18	54	55.5	25.3	18.705 70	1613	1.83	0.47	17	14.3
15	8	42	03.39	6.41	18	54	30.2	26.2	18.721 83	1606	1.83	0.47	17	10.4
16	8	42	09.80	+6.61	+18	54	04.0	-26.8	18.737 89	+1598	1.83	0.47	17	06.6
17	8	42	16.41		+18	53	37.2		18.753 87		1.83	0.47	17	02.8

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME												Transit, Meridian of Green- wich		
Date	Apparent Right Ascension				Apparent Declination			True Distance from Earth		Semi- diam- eter	Hor. Paral- lax			
	h	m	s		°	'	"			"	"	h	m	
May	17	8 42	16.41	+ 6.80	+18 53	37.2	-27.6	18.753 87	+1591	1.83	0.47	17	02.8	
	18	8 42	23.21	7.00	18 53	09.6	28.3	18.769 78	1582	1.83	0.47	16	59.0	
	19	8 42	30.21	7.19	18 52	41.3	29.1	18.785 60	1571	1.82	0.47	16	55.2	
	20	8 42	37.40	7.37	18 52	12.2	29.8	18.801 31	1561	1.82	0.47	16	51.4	
	21	8 42	44.77	7.57	18 51	42.4	30.4	18.816 92	1553	1.82	0.47	16	47.6	
	22	8 42	52.34	+ 7.76	+18 51	12.0	-31.3	18.832 45	+1541	1.82	0.47	16	43.8	
	23	8 43	00.10	7.94	18 50	40.7	31.9	18.847 86	1530	1.82	0.47	16	40.0	
	24	8 43	08.04	8.12	18 50	08.8	32.7	18.863 16	1519	1.82	0.47	16	36.2	
	25	8 43	16.16	8.30	18 49	36.1	33.4	18.878 35	1506	1.82	0.47	16	32.4	
	26	8 43	24.46	8.49	18 49	02.7	34.0	18.893 41	1496	1.81	0.47	16	28.6	
	27	8 43	32.95	+ 8.65	+18 48	28.7	-34.7	18.908 37	+1482	1.81	0.47	16	24.8	
	28	8 43	41.60	8.83	18 47	54.0	35.4	18.923 19	1469	1.81	0.47	16	21.0	
	29	8 43	50.43	9.01	18 47	18.6	36.0	18.937 88	1456	1.81	0.46	16	17.2	
	30	8 43	59.44	9.17	18 46	42.6	36.7	18.952 44	1443	1.81	0.46	16	13.4	
	31	8 44	08.61	9.34	18 46	05.9	37.5	18.966 87	1429	1.81	0.46	16	09.6	
	June	1	8 44	17.95	+ 9.50	+18 45	28.4	-38.0	18.981 16	+1414	1.81	0.46	16	05.9
		2	8 44	27.45	9.66	18 44	50.4	38.6	18.995 30	1400	1.80	0.46	16	02.1
		3	8 44	37.11	9.84	18 44	11.8	39.3	19.009 30	1385	1.80	0.46	15	58.3
		4	8 44	46.95	9.98	18 43	32.5	39.9	19.023 15	1369	1.80	0.46	15	54.6
		5	8 44	56.93	10.14	18 42	52.6	40.6	19.036 84	1355	1.80	0.46	15	50.8
6		8 45	07.07	+10.30	+18 42	12.0	-41.2	19.050 39	+1338	1.80	0.46	15	47.0	
7		8 45	17.37	10.46	18 41	30.8	41.8	19.063 77	1323	1.80	0.46	15	43.3	
8		8 45	27.83	10.60	18 40	49.0	42.3	19.077 00	1305	1.80	0.46	15	39.5	
9		8 45	38.43	10.76	18 40	06.7	43.0	19.090 05	1289	1.80	0.46	15	35.8	
10		8 45	49.19	10.90	18 39	23.7	43.6	19.102 94	1272	1.79	0.46	15	32.0	
	11	8 46	00.09	+11.04	+18 38	40.1	-44.2	19.115 66	+1254	1.79	0.46	15	28.3	
	12	8 46	11.13	11.20	18 37	55.9	44.7	19.128 20	1236	1.79	0.46	15	24.5	
	13	8 46	22.33	11.32	18 37	11.2	45.3	19.140 56	1218	1.79	0.46	15	20.8	
	14	8 46	33.65	11.47	18 36	25.9	45.9	19.152 74	1200	1.79	0.46	15	17.0	
	15	8 46	45.12	11.60	18 35	40.0	46.4	19.164 74	1181	1.79	0.46	15	13.3	
	16	8 46	56.72	+11.74	+18 34	53.6	-47.0	19.176 55	+1162	1.79	0.46	15	09.6	
	17	8 47	08.46	11.87	18 34	06.6	47.5	19.188 17	1141	1.79	0.46	15	05.8	
	18	8 47	20.33	11.99	18 33	19.1	48.1	19.199 58	1123	1.79	0.46	15	02.1	
	19	8 47	32.32	12.12	18 32	31.0	48.5	19.210 81	1101	1.78	0.46	14	58.4	
	20	8 47	44.44	12.24	18 31	42.5	49.0	19.221 82	1082	1.78	0.46	14	54.6	
	21	8 47	56.68	+12.36	+18 30	53.5	-49.6	19.232 64	+1061	1.78	0.46	14	50.9	
	22	8 48	09.04	12.48	18 30	03.9	50.0	19.243 25	1041	1.78	0.46	14	47.2	
	23	8 48	21.52	12.59	18 29	13.9	50.5	19.253 66	1019	1.78	0.46	14	43.4	
	24	8 48	34.11	12.70	18 28	23.4	51.1	19.263 85	997	1.78	0.46	14	39.7	
	25	8 48	46.81	12.81	18 27	32.3	51.4	19.273 82	977	1.78	0.46	14	36.0	
	26	8 48	59.62	+12.92	+18 26	40.9	-51.9	19.283 59	+ 954	1.78	0.46	14	32.3	
	27	8 49	12.54	13.02	18 25	49.0	52.3	19.293 13	933	1.78	0.46	14	28.6	
	28	8 49	25.56	13.12	18 24	56.7	52.8	19.302 46	911	1.78	0.46	14	24.9	
	29	8 49	38.68	13.22	18 24	03.9	53.2	19.311 57	888	1.78	0.46	14	21.1	
	30	8 49	51.90	13.31	18 23	10.7	53.6	19.320 45	865	1.77	0.46	14	17.4	
July	1	8 50	05.21	+13.41	+18 22	17.1	-54.0	19.329 10	+ 844	1.77	0.46	14	13.7	
	2	8 50	18.62		+18 21	23.1		19.337 54		1.77	0.46	14	10.0	

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension		Apparent Declination		True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich			
		h	m	s	°	'	"	"	"	h	m		
July	1	8	50	05.21	+18	22	17.1	19.329	10	1.77	0.46	14	13.7
	2	8	50	18.62	+13.41	18	21	23.1	+844	1.77	0.46	14	10.0
	3	8	50	32.12	13.50	18	20	28.6	821	1.77	0.45	14	06.3
	4	8	50	45.70	13.58	18	19	33.8	796	1.77	0.45	14	02.6
	5	8	50	59.37	13.67	18	18	38.6	774	1.77	0.45	13	58.9
				13.75				55.6	751				
	6	8	51	13.12	+18	17	43.0	19.368	96	1.77	0.45	13	55.2
	7	8	51	26.97	+13.85	18	16	47.1	+727	1.77	0.45	13	51.5
	8	8	51	40.88	13.91	18	15	50.8	703	1.77	0.45	13	47.8
	9	8	51	54.87	13.99	18	14	54.2	680	1.77	0.45	13	44.1
	10	8	52	08.93	14.06	18	13	57.3	654	1.77	0.45	13	40.4
				14.14				57.3	631				
	11	8	52	23.07	+18	13	00.0	19.402	91	1.77	0.45	13	36.7
	12	8	52	37.27	+14.20	18	12	02.3	+606	1.77	0.45	13	33.0
	13	8	52	51.54	14.27	18	11	04.4	581	1.77	0.45	13	29.3
	14	8	53	05.87	14.33	18	10	06.1	557	1.77	0.45	13	25.6
	15	8	53	20.26	14.39	18	09	07.6	531	1.77	0.45	13	21.9
				14.46				58.8	506	1.76	0.45		
	16	8	53	34.72	+18	08	08.8	19.430	72	1.76	0.45	13	18.2
	17	8	53	49.22	+14.50	18	07	09.8	+481	1.76	0.45	13	14.5
	18	8	54	03.77	14.55	18	06	10.5	455	1.76	0.45	13	10.8
	19	8	54	18.37	14.60	18	05	11.0	429	1.76	0.45	13	07.2
	20	8	54	33.02	14.65	18	04	11.2	404	1.76	0.45	13	03.5
				14.69				60.0	377				
	21	8	54	47.71	+18	03	11.2	19.452	18	1.76	0.45	12	59.8
	22	8	55	02.43	+14.72	18	02	11.0	+353	1.76	0.45	12	56.1
	23	8	55	17.20	14.77	18	01	10.6	326	1.76	0.45	12	52.4
	24	8	55	31.99	14.79	18	00	10.1	300	1.76	0.45	12	48.7
	25	8	55	46.82	14.83	17	59	09.4	274	1.76	0.45	12	45.0
				14.85				61.0	247				
	26	8	56	01.67	+17	58	08.4	19.467	18	1.76	0.45	12	41.3
	27	8	56	16.56	+14.89	17	57	07.4	+221	1.76	0.45	12	37.7
	28	8	56	31.46	14.90	17	56	06.3	195	1.76	0.45	12	34.0
	29	8	56	46.38	14.92	17	55	04.9	170	1.76	0.45	12	30.3
	30	8	57	01.31	14.93	17	54	03.5	143	1.76	0.45	12	26.6
				14.96				61.5	117				
Aug.	31	8	57	16.27	+17	53	02.0	19.475	64	1.76	0.45	12	22.9
	1	8	57	31.23	+14.96	17	52	00.3	+ 90	1.76	0.45	12	19.2
	2	8	57	46.20	14.97	17	50	58.5	64	1.76	0.45	12	15.6
	3	8	58	01.19	14.99	17	49	56.8	38	1.76	0.45	12	11.9
	4	8	58	16.17	14.98	17	48	54.9	+ 11	1.76	0.45	12	08.2
				14.99				62.0	- 15				
	5	8	58	31.16	+17	47	52.9	19.477	52	1.76	0.45	12	04.5
	6	8	58	46.15	+14.99	17	46	50.9	- 42	1.76	0.45	12	00.8
	7	8	59	01.12	14.97	17	45	48.9	68	1.76	0.45	11	57.1
	8	8	59	16.10	14.98	17	44	46.9	95	1.76	0.45	11	53.5
	9	8	59	31.07	14.97	17	43	44.8	121	1.76	0.45	11	49.8
				14.95				62.0	148				
	10	8	59	46.02	+17	42	42.8	19.472	78	1.76	0.45	11	46.1
	11	9	00	00.97	+14.95	17	41	40.7	-175	1.76	0.45	11	42.4
	12	9	00	15.89	14.92	17	40	38.7	201	1.76	0.45	11	38.7
	13	9	00	30.79	14.90	17	39	36.8	228	1.76	0.45	11	35.0
14	9	00	45.67	14.88	17	38	34.9	254	1.76	0.45	11	31.3	
			14.85				61.9	281					
15	9	01	00.52	+17	37	33.0	19.461	39	1.76	0.45	11	27.7	
16	9	01	15.34	+14.82	17	36	31.2	-307	1.76	0.45	11	24.0	

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Semi- diam- eter	Hor. Paral- ax	Transit, Meridian of Green- wich
		h m s	° ' " "		"	"	h m
Aug.	16	9 01 15.34	+17 36 31.2	19.458 32	1.76	0.45	11 24.0
	17	9 01 30.13	17 35 29.5	19.454 98	1.76	0.45	11 20.3
	18	9 01 44.88	17 34 28.0	19.451 38	1.76	0.45	11 16.6
	19	9 01 59.60	17 33 26.5	19.447 51	1.76	0.45	11 12.9
	20	9 02 14.27	17 32 25.2	19.443 38	1.76	0.45	11 09.2
	21	9 02 28.90	+17 31 24.1	19.439 00	1.76	0.45	11 05.5
	22	9 02 43.47	17 30 23.1	19.434 35	1.76	0.45	11 01.8
	23	9 02 58.00	17 29 22.2	19.429 44	1.76	0.45	10 58.2
	24	9 03 12.48	17 28 21.5	19.424 28	1.76	0.45	10 54.5
	25	9 03 26.90	17 27 21.1	19.418 87	1.77	0.45	10 50.8
	26	9 03 41.25	+17 26 20.8	19.413 20	1.77	0.45	10 47.1
	27	9 03 55.56	17 25 20.8	19.407 28	1.77	0.45	10 43.4
	28	9 04 09.79	17 24 20.9	19.401 10	1.77	0.45	10 39.7
	29	9 04 23.96	17 23 21.4	19.394 68	1.77	0.45	10 36.0
	30	9 04 38.07	17 22 22.0	19.388 00	1.77	0.45	10 32.3
	31	9 04 52.10	+17 21 22.9	19.381 08	1.77	0.45	10 28.6
	1	9 05 06.06	17 20 24.2	19.373 92	1.77	0.45	10 24.9
	2	9 05 19.94	17 19 25.7	19.366 51	1.77	0.45	10 21.2
	3	9 05 33.75	17 18 27.5	19.358 85	1.77	0.45	10 17.5
	4	9 05 47.47	17 17 29.6	19.350 96	1.77	0.45	10 13.8
Sept.	5	9 06 01.11	+17 16 32.0	19.342 82	1.77	0.45	10 10.1
	6	9 06 14.66	17 15 34.8	19.334 45	1.77	0.46	10 06.4
	7	9 06 28.12	17 14 37.9	19.325 83	1.77	0.46	10 02.7
	8	9 06 41.50	17 13 41.4	19.316 98	1.77	0.46	9 58.9
	9	9 06 54.78	17 12 45.3	19.307 89	1.78	0.46	9 55.2
	10	9 07 07.95	+17 11 49.6	19.298 58	1.78	0.46	9 51.5
	11	9 07 21.03	17 10 54.3	19.289 03	1.78	0.46	9 47.8
	12	9 07 34.01	17 09 59.3	19.279 25	1.78	0.46	9 44.1
	13	9 07 46.88	17 09 04.9	19.269 24	1.78	0.46	9 40.4
	14	9 07 59.64	17 08 10.8	19.259 02	1.78	0.46	9 36.6
	15	9 08 12.28	+17 07 17.3	19.248 57	1.78	0.46	9 32.9
	16	9 08 24.82	17 06 24.2	19.237 90	1.78	0.46	9 29.2
	17	9 08 37.23	17 05 31.6	19.227 01	1.78	0.46	9 25.5
	18	9 08 49.52	17 04 39.4	19.215 92	1.78	0.46	9 21.7
	19	9 09 01.69	17 03 47.9	19.204 61	1.78	0.46	9 18.0
	20	9 09 13.74	+17 02 56.8	19.193 10	1.79	0.46	9 14.3
	21	9 09 25.66	17 02 06.3	19.181 38	1.79	0.46	9 10.5
	22	9 09 37.45	17 01 16.3	19.169 46	1.79	0.46	9 06.8
	23	9 09 49.10	17 00 27.0	19.157 35	1.79	0.46	9 03.1
	24	9 10 00.62	16 59 38.1	19.145 03	1.79	0.46	8 59.3
	25	9 10 12.01	+16 58 49.9	19.132 53	1.79	0.46	8 55.6
	26	9 10 23.24	16 58 02.2	19.119 84	1.79	0.46	8 51.8
	27	9 10 34.35	16 57 15.1	19.106 96	1.79	0.46	8 48.1
	28	9 10 45.31	16 56 28.6	19.093 90	1.80	0.46	8 44.3
	29	9 10 56.12	16 55 42.9	19.080 65	1.80	0.46	8 40.6
	30	9 11 06.79	+16 54 57.6	19.067 24	1.80	0.46	8 36.8
	Oct. 1	9 11 17.31	+16 54 13.1	19.053 65	1.80	0.46	8 33.1

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich		
	h	m	s	s	°	'	"	"			"	"	h	m	
Oct.	1	9	11	17.31	+10.36	+16	54	13.1	-43.8	19.053 65	-1376	1.80	0.46	8	33.1
	2	9	11	27.67	10.20	16	53	29.3	43.3	19.039 89	1394	1.80	0.46	8	29.3
	3	9	11	37.87	10.05	16	52	46.0	42.5	19.025 95	1409	1.80	0.46	8	25.5
	4	9	11	47.92	9.89	16	52	03.5	41.8	19.011 86	1426	1.80	0.46	8	21.8
	5	9	11	57.81	9.73	16	51	21.7	41.1	18.997 60	1442	1.80	0.46	8	18.0
	6	9	12	07.54	+9.57	+16	50	40.6	-40.4	18.983 18	-1457	1.81	0.46	8	14.2
	7	9	12	17.11	9.40	16	50	00.2	39.6	18.968 61	1472	1.81	0.46	8	10.5
	8	9	12	26.51	9.22	16	49	20.6	38.9	18.953 89	1488	1.81	0.46	8	06.7
	9	9	12	35.73	9.06	16	48	41.7	38.2	18.939 01	1500	1.81	0.46	8	02.9
	10	9	12	44.79	8.89	16	48	03.5	37.3	18.924 01	1516	1.81	0.47	7	59.1
	11	9	12	53.68	+8.70	+16	47	26.2	-36.6	18.908 85	-1529	1.81	0.47	7	55.3
	12	9	13	02.38	8.53	16	46	49.6	35.8	18.893 56	1542	1.81	0.47	7	51.5
	13	9	13	10.91	8.35	16	46	13.8	35.0	18.878 14	1555	1.82	0.47	7	47.8
	14	9	13	19.26	8.16	16	45	38.8	34.1	18.862 59	1567	1.82	0.47	7	44.0
	15	9	13	27.42	7.98	16	45	04.7	33.4	18.846 92	1579	1.82	0.47	7	40.2
	16	9	13	35.40	+7.79	+16	44	31.3	-32.5	18.831 13	-1590	1.82	0.47	7	36.4
	17	9	13	43.19	7.60	16	43	58.8	31.7	18.815 23	1601	1.82	0.47	7	32.6
	18	9	13	50.79	7.41	16	43	27.1	30.9	18.799 22	1612	1.82	0.47	7	28.8
	19	9	13	58.20	7.23	16	42	56.2	30.0	18.783 10	1622	1.83	0.47	7	24.9
	20	9	14	05.43	7.03	16	42	26.2	29.0	18.766 88	1630	1.83	0.47	7	21.1
	21	9	14	12.46	+6.83	+16	41	57.2	-28.2	18.750 58	-1641	1.83	0.47	7	17.3
	22	9	14	19.29	6.65	16	41	29.0	27.5	18.734 17	1649	1.83	0.47	7	13.5
	23	9	14	25.94	6.43	16	41	01.5	26.4	18.717 68	1656	1.83	0.47	7	09.7
	24	9	14	32.37	6.25	16	40	35.1	25.6	18.701 12	1665	1.83	0.47	7	05.8
	25	9	14	38.62	6.03	16	40	09.5	24.7	18.684 47	1672	1.83	0.47	7	02.0
	26	9	14	44.65	+5.84	+16	39	44.8	-23.7	18.667 75	-1680	1.84	0.47	6	58.2
	27	9	14	50.49	5.64	16	39	21.1	22.8	18.650 95	1685	1.84	0.47	6	54.3
	28	9	14	56.13	5.43	16	38	58.3	21.9	18.634 10	1691	1.84	0.47	6	50.5
	29	9	15	01.56	5.22	16	38	36.4	21.1	18.617 19	1697	1.84	0.47	6	46.7
	30	9	15	06.78	5.03	16	38	15.3	20.0	18.600 22	1702	1.84	0.47	6	42.8
Nov.	31	9	15	11.81	+4.80	+16	37	55.3	-19.2	18.583 20	-1706	1.84	0.47	6	39.0
	1	9	15	16.61	4.60	16	37	36.1	18.1	18.566 14	1712	1.84	0.47	6	35.1
	2	9	15	21.21	4.39	16	37	18.0	17.2	18.549 02	1715	1.85	0.47	6	31.3
	3	9	15	25.60	4.18	16	37	00.8	16.3	18.531 87	1717	1.85	0.47	6	27.4
	4	9	15	29.78	3.95	16	36	44.5	15.2	18.514 70	1721	1.85	0.48	6	23.5
	5	9	15	33.73	+3.76	+16	36	29.3	-14.3	18.497 49	-1723	1.85	0.48	6	19.7
	6	9	15	37.49	3.53	16	36	15.0	13.3	18.480 26	1725	1.85	0.48	6	15.8
	7	9	15	41.02	3.31	16	36	01.7	12.3	18.463 01	1725	1.86	0.48	6	11.9
	8	9	15	44.33	3.10	16	35	49.4	11.4	18.445 76	1728	1.86	0.48	6	08.0
	9	9	15	47.43	2.88	16	35	38.0	10.4	18.428 48	1727	1.86	0.48	6	04.2
	10	9	15	50.31	+2.65	+16	35	27.6	-9.3	18.411 21	-1727	1.86	0.48	6	00.3
	11	9	15	52.96	2.44	16	35	18.3	8.4	18.393 94	1725	1.86	0.48	5	56.4
	12	9	15	55.40	2.21	16	35	09.9	7.2	18.376 69	1724	1.87	0.48	5	52.5
	13	9	15	57.61	1.99	16	35	02.7	6.4	18.359 45	1723	1.87	0.48	5	48.6
	14	9	15	59.60	1.77	16	34	56.3	5.3	18.342 22	1720	1.87	0.48	5	44.7
	15	9	16	01.37	+1.55	+16	34	51.0	-4.3	18.325 02	-1716	1.87	0.48	5	40.8
16	9	16	02.92		+16	34	46.7		18.307 86		1.87	0.48	5	36.9	

URANUS, 1958
FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension		Apparent Declination		True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m s	° ' "	"				h m
Nov. 16	9	16 02.92	+16 34 46.7	- 3.4	18.307 86	1.87	0.48	5 36.9
17	9	16 04.24	16 34 43.3	2.4	18.290 74	1.87	0.48	5 33.0
18	9	16 05.34	16 34 40.9	1.2	18.273 65	1.88	0.48	5 29.1
19	9	16 06.22	16 34 39.7	- 0.3	18.256 61	1.88	0.48	5 25.1
20	9	16 06.88	16 34 39.4	+ 0.6	18.239 63	1.88	0.48	5 21.2
21	9	16 07.31	+16 34 40.0	+ 1.7	18.222 69	1.88	0.48	5 17.3
22	9	16 07.52	16 34 41.7	2.7	18.205 82	1.88	0.48	5 13.4
23	9	16 07.52	16 34 44.4	3.7	18.189 02	1.88	0.48	5 09.4
24	9	16 07.29	16 34 48.1	4.7	18.172 30	1.89	0.48	5 05.5
25	9	16 06.84	16 34 52.8	5.6	18.155 64	1.89	0.48	5 01.6
26	9	16 06.17	+16 34 58.4	+ 6.7	18.139 08	1.89	0.49	4 57.6
27	9	16 05.28	16 35 05.1	7.7	18.122 60	1.89	0.49	4 53.7
28	9	16 04.17	16 35 12.8	8.6	18.106 21	1.89	0.49	4 49.7
29	9	16 02.84	16 35 21.4	9.5	18.089 91	1.89	0.49	4 45.8
30	9	16 01.29	16 35 30.9	10.7	18.073 72	1.90	0.49	4 41.8
Dec. 1	9	15 59.52	+16 35 41.6	+11.5	18.057 64	1.90	0.49	4 37.8
2	9	15 57.54	16 35 53.1	12.5	18.041 67	1.90	0.49	4 33.9
3	9	15 55.34	16 36 05.6	13.5	18.025 81	1.90	0.49	4 29.9
4	9	15 52.93	16 36 19.1	14.5	18.010 08	1.90	0.49	4 25.9
5	9	15 50.30	16 36 33.6	15.4	17.994 47	1.91	0.49	4 22.0
6	9	15 47.45	+16 36 49.0	+16.4	17.979 00	1.91	0.49	4 18.0
7	9	15 44.39	16 37 05.4	17.2	17.963 66	1.91	0.49	4 14.0
8	9	15 41.13	16 37 22.6	18.2	17.948 47	1.91	0.49	4 10.0
9	9	15 37.64	16 37 40.8	19.1	17.933 42	1.91	0.49	4 06.0
10	9	15 33.95	16 37 59.9	20.1	17.918 53	1.91	0.49	4 02.0
11	9	15 30.05	+16 38 20.0	+21.0	17.903 80	1.91	0.49	3 58.0
12	9	15 25.95	16 38 41.0	21.9	17.889 23	1.92	0.49	3 54.0
13	9	15 21.63	16 39 02.9	22.7	17.874 84	1.92	0.49	3 50.0
14	9	15 17.13	16 39 25.6	23.7	17.860 62	1.92	0.49	3 46.0
15	9	15 12.41	16 39 49.3	24.3	17.846 57	1.92	0.49	3 42.0
16	9	15 07.50	+16 40 13.6	+25.3	17.832 71	1.92	0.49	3 38.0
17	9	15 02.40	16 40 38.9	26.1	17.819 04	1.92	0.49	3 34.0
18	9	14 57.11	16 41 05.0	27.1	17.805 57	1.93	0.49	3 30.0
19	9	14 51.62	16 41 32.1	27.7	17.792 29	1.93	0.49	3 25.9
20	9	14 45.94	16 41 59.8	28.6	17.779 22	1.93	0.49	3 21.9
21	9	14 40.08	+16 42 28.4	+29.4	17.766 34	1.93	0.50	3 17.9
22	9	14 34.05	16 42 57.8	30.0	17.753 68	1.93	0.50	3 13.8
23	9	14 27.82	16 43 27.8	30.9	17.741 23	1.93	0.50	3 09.8
24	9	14 21.43	16 43 58.7	31.6	17.729 00	1.93	0.50	3 05.8
25	9	14 14.86	16 44 30.3	32.4	17.717 00	1.93	0.50	3 01.7
26	9	14 08.11	+16 45 02.7	+33.0	17.705 21	1.94	0.50	2 57.7
27	9	14 01.20	16 45 35.7	33.7	17.693 66	1.94	0.50	2 53.6
28	9	13 54.12	16 46 09.4	34.4	17.682 34	1.94	0.50	2 49.6
29	9	13 46.88	16 46 43.8	35.1	17.671 26	1.94	0.50	2 45.5
30	9	13 39.48	16 47 18.9	35.7	17.660 42	1.94	0.50	2 41.5
31	9	13 31.92	+16 47 54.6	+36.4	17.649 82	1.94	0.50	2 37.4
32	9	13 24.21	+16 48 31.0		17.639 46	1.94	0.50	2 33.4

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	"	"	° ' "	"		
Jan.	- 3	129 11 41.3	45.60	+8.8	+0 38 10.3	+0.35	1.266 9513	-30.1
	7	129 19 17.4	45.61	8.7	0 38 13.7	0.35	1.266 9212	30.0
	17	129 26 53.5	45.61	8.7	0 38 17.2	0.35	1.266 8913	30.0
	27	129 34 29.6	45.62	8.7	0 38 20.7	0.35	1.266 8613	29.9
Feb.	6	129 42 05.8	45.62	8.7	0 38 24.1	0.34	1.266 8315	29.8
	16	129 49 42.0	45.63	+8.7	+0 38 27.6	+0.34	1.266 8017	-29.7
	26	129 57 18.3	45.63	8.7	0 38 31.0	0.34	1.266 7720	29.7
Mar.	8	130 04 54.7	45.64	8.7	0 38 34.4	0.34	1.266 7423	29.6
	18	130 12 31.1	45.64	8.6	0 38 37.9	0.34	1.266 7127	29.5
	28	130 20 07.5	45.65	8.6	0 38 41.3	0.34	1.266 6832	29.5
	7	130 27 44.1	45.65	+8.6	+0 38 44.7	+0.34	1.266 6538	-29.4
Apr.	17	130 35 20.6	45.66	8.6	0 38 48.0	0.34	1.266 6244	29.3
	27	130 42 57.2	45.66	8.6	0 38 51.4	0.34	1.266 5951	29.3
	7	130 50 33.9	45.67	8.6	0 38 54.8	0.33	1.266 5659	29.2
May	17	130 58 10.6	45.67	8.5	0 38 58.1	0.33	1.266 5368	29.1
	27	131 05 47.3	45.68	+8.5	+0 39 01.4	+0.33	1.266 5077	-29.0
June	6	131 13 24.2	45.68	8.5	0 39 04.8	0.33	1.266 4787	29.0
	16	131 21 01.0	45.69	8.5	0 39 08.1	0.33	1.266 4497	28.9
	26	131 28 37.9	45.69	8.5	0 39 11.4	0.33	1.266 4209	28.8
July	6	131 36 14.9	45.70	8.5	0 39 14.7	0.33	1.266 3921	28.7
	16	131 43 51.9	45.70	+8.4	+0 39 17.9	+0.33	1.266 3634	-28.7
Aug.	26	131 51 29.0	45.71	8.4	0 39 21.2	0.33	1.266 3348	28.6
	5	131 59 06.1	45.71	8.4	0 39 24.5	0.32	1.266 3062	28.5
	15	132 06 43.2	45.72	8.4	0 39 27.7	0.32	1.266 2777	28.4
	25	132 14 20.5	45.72	8.4	0 39 30.9	0.32	1.266 2493	28.4
Sept.	4	132 21 57.7	45.73	+8.3	+0 39 34.2	+0.32	1.266 2210	-28.3
	14	132 29 35.0	45.73	8.3	0 39 37.4	0.32	1.266 1928	28.2
	24	132 37 12.4	45.74	8.3	0 39 40.6	0.32	1.266 1646	28.1
Oct.	4	132 44 49.8	45.74	8.3	0 39 43.8	0.32	1.266 1365	28.1
	14	132 52 27.2	45.75	8.3	0 39 46.9	0.32	1.266 1085	28.0
Nov.	24	133 00 04.7	45.75	+8.2	+0 39 50.1	+0.32	1.266 0805	-27.9
	3	133 07 42.3	45.76	8.2	0 39 53.3	0.31	1.266 0526	27.8
	13	133 15 19.9	45.76	8.2	0 39 56.4	0.31	1.266 0248	27.8
	23	133 22 57.5	45.77	8.2	0 39 59.5	0.31	1.265 9971	27.7
Dec.	3	133 30 35.2	45.77	8.2	0 40 02.7	0.31	1.265 9694	27.6
	13	133 38 12.9	45.78	+8.1	+0 40 05.8	+0.31	1.265 9418	-27.5
	23	133 45 50.7	45.78	8.1	0 40 08.9	0.31	1.265 9143	27.5
	33	133 53 28.5	45.78	+8.1	+0 40 12.0	+0.31	1.265 8869	-27.4

NEPTUNE, 1958
FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
		h	m	s	s	°	'	"	"					h	m
Jan.	0	14	10	58.78		-11	21	48.6		30.737 20	-1577	1.19	0.29	7	33.1
	1	14	11	03.38	+4.60	11	22	09.3	20.7	30.721 43	1590	1.19	0.29	7	29.3
	2	14	11	07.87	4.49	11	22	29.2	19.9	30.705 53	1601	1.19	0.29	7	25.4
	3	14	11	12.24	4.37	11	22	48.4	19.2	30.689 52	1612	1.19	0.29	7	21.6
	4	14	11	16.50	4.26	11	23	07.0	18.6	30.673 40	1622	1.19	0.29	7	17.7
					4.14				18.1						
	5	14	11	20.64		-11	23	25.1		30.657 18	-1634	1.19	0.29	7	13.8
	6	14	11	24.66	+4.02	11	23	42.4	-17.3	30.640 84	1643	1.19	0.29	7	10.0
	7	14	11	28.57	3.91	11	23	59.1	16.7	30.624 41	1652	1.19	0.29	7	06.1
	8	14	11	32.35	3.78	11	24	15.2	16.1	30.607 89	1661	1.19	0.29	7	02.2
	9	14	11	36.01	3.66	11	24	30.6	15.4	30.591 28	1670	1.20	0.29	6	58.4
					3.54				14.7						
	10	14	11	39.55		-11	24	45.3		30.574 58	-1678	1.20	0.29	6	54.5
	11	14	11	42.97	+3.42	11	24	59.3	-14.0	30.557 80	1686	1.20	0.29	6	50.6
	12	14	11	46.26	3.29	11	25	12.7	13.4	30.540 94	1693	1.20	0.29	6	46.7
	13	14	11	49.43	3.17	11	25	25.5	12.8	30.524 01	1698	1.20	0.29	6	42.9
	14	14	11	52.48	3.05	11	25	37.5	12.0	30.507 03	1705	1.20	0.29	6	39.0
					2.92				11.4						
	15	14	11	55.40		-11	25	48.9		30.489 98	-1712	1.20	0.29	6	35.1
	16	14	11	58.18	+2.78	11	25	59.6	-10.7	30.472 86	1716	1.20	0.29	6	31.2
	17	14	12	00.85	2.67	11	26	09.6	10.0	30.455 70	1719	1.20	0.29	6	27.3
	18	14	12	03.38	2.53	11	26	18.9	9.3	30.438 51	1724	1.20	0.29	6	23.4
	19	14	12	05.78	2.40	11	26	27.5	8.6	30.421 27	1728	1.20	0.29	6	19.5
					2.28				8.0						
	20	14	12	08.06		-11	26	35.5		30.403 99	-1730	1.20	0.29	6	15.6
	21	14	12	10.20	+2.14	11	26	42.7	-7.2	30.386 69	1733	1.20	0.29	6	11.7
	22	14	12	12.22	2.02	11	26	49.3	6.6	30.369 36	1734	1.20	0.29	6	07.8
	23	14	12	14.10	1.88	11	26	55.2	5.9	30.352 02	1735	1.20	0.29	6	03.9
	24	14	12	15.85	1.75	11	27	00.4	5.2	30.334 67	1736	1.21	0.29	6	00.0
					1.62				4.4						
	25	14	12	17.47		-11	27	04.8		30.317 31	-1735	1.21	0.29	5	56.1
	26	14	12	18.96	+1.49	11	27	08.7	-3.9	30.299 96	1735	1.21	0.29	5	52.2
	27	14	12	20.31	1.35	11	27	11.8	3.1	30.282 61	1734	1.21	0.29	5	48.3
	28	14	12	21.54	1.23	11	27	14.2	2.4	30.265 27	1733	1.21	0.29	5	44.4
	29	14	12	22.63	1.09	11	27	15.9	1.7	30.247 94	1730	1.21	0.29	5	40.5
					0.96				1.1						
Feb.	30	14	12	23.59		-11	27	17.0		30.230 64	-1727	1.21	0.29	5	36.6
	31	14	12	24.41	+0.82	11	27	17.4	-0.4	30.213 37	1725	1.21	0.29	5	32.7
	1	14	12	25.11	0.70	11	27	17.0	+0.4	30.196 12	1720	1.21	0.29	5	28.7
	2	14	12	25.67	0.56	11	27	16.0	1.0	30.178 92	1716	1.21	0.29	5	24.8
	3	14	12	26.10	0.43	11	27	14.3	1.7	30.161 76	1713	1.21	0.29	5	20.9
					0.30				2.3						
	4	14	12	26.40		-11	27	12.0		30.144 63	-1706	1.21	0.29	5	17.0
	5	14	12	26.57	+0.17	11	27	08.9	+3.1	30.127 57	1701	1.21	0.29	5	13.0
	6	14	12	26.62	+0.05	11	27	05.3	3.6	30.110 56	1695	1.21	0.29	5	09.1
	7	14	12	26.52	-0.10	11	27	00.9	4.4	30.093 61	1688	1.21	0.29	5	05.2
	8	14	12	26.30	0.22	11	26	55.8	5.1	30.076 73	1681	1.22	0.29	5	01.2
					0.35				5.7						
	9	14	12	25.95		-11	26	50.1		30.059 92	-1673	1.22	0.29	4	57.3
	10	14	12	25.46	-0.49	11	26	43.7	+6.4	30.043 19	1665	1.22	0.29	4	53.4
	11	14	12	24.85	0.61	11	26	36.7	7.0	30.026 54	1657	1.22	0.29	4	49.4
	12	14	12	24.11	0.74	11	26	29.0	7.7	30.009 97	1647	1.22	0.29	4	45.5
	13	14	12	23.24	0.87	11	26	20.6	8.4	29.993 50	1638	1.22	0.29	4	41.5
					1.00				9.0						
	14	14	12	22.24		-11	26	11.6		29.977 12	-1626	1.22	0.29	4	37.6
	15	14	12	21.11	-1.13	-11	26	02.0	+9.6	29.960 86	1626	1.22	0.29	4	33.6

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"		"	"	h	m
Feb. 15	14	12	21.11	-1.26	-11	26	02.0	+10.3	29.960 86	-1617	1.22	0.29	4 33.6
16	14	12	19.85	1.38	11	25	51.7	11.0	29.944 69	1605	1.22	0.29	4 29.7
17	14	12	18.47	1.51	11	25	40.7	11.5	29.928 64	1594	1.22	0.29	4 25.7
18	14	12	16.96	1.63	11	25	29.2	12.2	29.912 70	1580	1.22	0.29	4 21.8
19	14	12	15.33	1.76	11	25	17.0	12.8	29.896 90	1568	1.22	0.29	4 17.8
20	14	12	13.57	-1.89	-11	25	04.2	+13.5	29.881 22	-1554	1.22	0.29	4 13.8
21	14	12	11.68	2.00	11	24	50.7	14.0	29.865 68	1541	1.22	0.29	4 09.9
22	14	12	09.68	2.13	11	24	36.7	14.6	29.850 27	1525	1.22	0.29	4 05.9
23	14	12	07.55	2.25	11	24	22.1	15.3	29.835 02	1512	1.23	0.29	4 01.9
24	14	12	05.30	2.37	11	24	06.8	15.9	29.819 90	1494	1.23	0.30	3 58.0
25	14	12	02.93	-2.47	-11	23	50.9	+16.4	29.804 96	-1480	1.23	0.30	3 54.0
26	14	12	00.46	2.61	11	23	34.5	17.0	29.790 16	1464	1.23	0.30	3 50.0
27	14	11	57.85	2.71	11	23	17.5	17.6	29.775 52	1446	1.23	0.30	3 46.1
28	14	11	55.14	2.83	11	22	59.9	18.1	29.761 06	1431	1.23	0.30	3 42.1
Mar. 1	14	11	52.31	2.94	11	22	41.8	18.6	29.746 75	1411	1.23	0.30	3 38.1
2	14	11	49.37	-3.06	-11	22	23.2	+19.3	29.732 64	-1393	1.23	0.30	3 34.1
3	14	11	46.31	3.16	11	22	03.9	19.7	29.718 71	1376	1.23	0.30	3 30.1
4	14	11	43.15	3.27	11	21	44.2	20.3	29.704 95	1357	1.23	0.30	3 26.1
5	14	11	39.88	3.38	11	21	23.9	20.8	29.691 38	1337	1.23	0.30	3 22.2
6	14	11	36.50	3.49	11	21	03.1	21.4	29.678 01	1318	1.23	0.30	3 18.2
7	14	11	33.01	-3.59	-11	20	41.7	+21.8	29.664 83	-1298	1.23	0.30	3 14.2
8	14	11	29.42	3.69	11	20	19.9	22.3	29.651 85	1278	1.23	0.30	3 10.2
9	14	11	25.73	3.79	11	19	57.6	22.8	29.639 07	1257	1.23	0.30	3 06.2
10	14	11	21.94	3.89	11	19	34.8	23.3	29.626 50	1237	1.23	0.30	3 02.2
11	14	11	18.05	3.99	11	19	11.5	23.8	29.614 13	1215	1.23	0.30	2 58.2
12	14	11	14.06	-4.09	-11	18	47.7	+24.2	29.601 98	-1192	1.24	0.30	2 54.2
13	14	11	09.97	4.18	11	18	23.5	24.7	29.590 06	1171	1.24	0.30	2 50.2
14	14	11	05.79	4.28	11	17	58.8	25.2	29.578 35	1148	1.24	0.30	2 46.2
15	14	11	01.51	4.37	11	17	33.6	25.6	29.566 87	1125	1.24	0.30	2 42.2
16	14	10	57.14	4.46	11	17	08.0	25.9	29.555 62	1101	1.24	0.30	2 38.2
17	14	10	52.68	-4.55	-11	16	42.1	+26.4	29.544 61	-1078	1.24	0.30	2 34.2
18	14	10	48.13	4.64	11	16	15.7	26.8	29.533 83	1055	1.24	0.30	2 30.2
19	14	10	43.49	4.72	11	15	48.9	27.3	29.523 28	1029	1.24	0.30	2 26.2
20	14	10	38.77	4.80	11	15	21.6	27.6	29.512 99	1004	1.24	0.30	2 22.2
21	14	10	33.97	4.88	11	14	54.0	27.9	29.502 95	979	1.24	0.30	2 18.2
22	14	10	29.09	-4.96	-11	14	26.1	+28.3	29.493 16	-955	1.24	0.30	2 14.1
23	14	10	24.13	5.04	11	13	57.8	28.7	29.483 61	928	1.24	0.30	2 10.1
24	14	10	19.09	5.11	11	13	29.1	29.0	29.474 33	903	1.24	0.30	2 06.1
25	14	10	13.98	5.18	11	13	00.1	29.3	29.465 30	876	1.24	0.30	2 02.1
26	14	10	08.80	5.26	11	12	30.8	29.7	29.456 54	850	1.24	0.30	1 58.1
27	14	10	03.54	-5.31	-11	12	01.1	+29.9	29.448 04	-822	1.24	0.30	1 54.1
28	14	09	58.23	5.39	11	11	31.2	30.2	29.439 82	797	1.24	0.30	1 50.0
29	14	09	52.84	5.44	11	11	01.0	30.5	29.431 85	769	1.24	0.30	1 46.0
30	14	09	47.40	5.51	11	10	30.5	30.8	29.424 16	741	1.24	0.30	1 42.0
31	14	09	41.89	5.57	11	09	59.7	31.0	29.416 75	714	1.24	0.30	1 38.0
Apr. 1	14	09	36.32	-5.61	-11	09	28.7	+31.2	29.409 61	-687	1.24	0.30	1 34.0
2	14	09	30.71		-11	08	57.5		29.402 74		1.24	0.30	1 29.9

NEPTUNE, 1958
FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME															Transit, Meridian of Green- wich	
Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax			
		h	m	s	s	°	'	"	"			"	"	h	m	
Apr.	1	14	09	36.32	-5.61	-11	09	28.7	+31.2	29.409	61	-687	1.24	0.30	1	34.0
	2	14	09	30.71	5.68	11	08	57.5	31.5	29.402	74	658	1.24	0.30	1	29.9
	3	14	09	25.03	5.72	11	08	26.0	31.8	29.396	16	631	1.24	0.30	1	25.9
	4	14	09	19.31	5.78	11	07	54.2	31.8	29.389	85	602	1.24	0.30	1	21.9
	5	14	09	13.53	5.82	11	07	22.4	32.1	29.383	83	575	1.24	0.30	1	17.8
	6	14	09	07.71	-5.86	-11	06	50.3	+32.3	29.378	08	-546	1.24	0.30	1	13.8
	7	14	09	01.85	5.91	11	06	18.0	32.4	29.372	62	518	1.24	0.30	1	09.8
	8	14	08	55.94	5.96	11	05	45.6	32.7	29.367	44	488	1.24	0.30	1	05.8
	9	14	08	49.98	5.98	11	05	12.9	32.7	29.362	56	460	1.25	0.30	1	01.7
	10	14	08	44.00	6.03	11	04	40.2	32.9	29.357	96	430	1.25	0.30	0	57.7
	11	14	08	37.97	-6.06	-11	04	07.3	+33.0	29.353	66	-402	1.25	0.30	0	53.7
	12	14	08	31.91	6.09	11	03	34.3	33.2	29.349	64	371	1.25	0.30	0	49.6
	13	14	08	25.82	6.13	11	03	01.1	33.1	29.345	93	344	1.25	0.30	0	45.6
	14	14	08	19.69	6.15	11	02	28.0	33.3	29.342	49	312	1.25	0.30	0	41.6
	15	14	08	13.54	6.16	11	01	54.7	33.4	29.339	37	283	1.25	0.30	0	37.5
	16	14	08	07.38	-6.20	-11	01	21.3	+33.4	29.336	54	-254	1.25	0.30	0	33.5
	17	14	08	01.18	6.21	11	00	47.9	33.5	29.334	00	224	1.25	0.30	0	29.5
	18	14	07	54.97	6.23	11	00	14.4	33.4	29.331	76	193	1.25	0.30	0	25.4
	19	14	07	48.74	6.25	10	59	41.0	33.5	29.329	83	164	1.25	0.30	0	21.4
	20	14	07	42.49	6.25	10	59	07.5	33.5	29.328	19	134	1.25	0.30	0	17.4
	21	14	07	36.24	-6.27	-10	58	34.0	+33.5	29.326	85	-103	1.25	0.30	0	13.3
	22	14	07	29.97	6.26	10	58	00.5	33.5	29.325	82	74	1.25	0.30	0	09.3
	23	14	07	23.71	6.28	10	57	27.0	33.4	29.325	08	43	1.25	0.30	0	05.3
	24	14	07	17.43	6.27	10	56	53.6	33.4	29.324	65	-14	1.25	0.30	{ ⁰ ₂₃	^{01.2} _{57.2}
	25	14	07	11.16	6.27	10	56	20.2	33.3	29.324	51	+16	1.25	0.30	23	53.1
	26	14	07	04.89	-6.28	-10	55	46.9	+33.2	29.324	67	+46	1.25	0.30	23	49.1
	27	14	06	58.61	6.26	10	55	13.7	33.1	29.325	13	77	1.25	0.30	23	45.1
	28	14	06	52.35	6.25	10	54	40.6	33.0	29.325	90	104	1.25	0.30	23	41.0
	29	14	06	46.10	6.25	10	54	07.6	33.0	29.326	94	136	1.25	0.30	23	37.0
	30	14	06	39.85	6.23	10	53	34.6	32.7	29.328	30	165	1.25	0.30	23	33.0
May	1	14	06	33.62	-6.21	-10	53	01.9	+32.7	29.329	95	+194	1.25	0.30	23	28.9
	2	14	06	27.41	6.20	10	52	29.2	32.5	29.331	89	223	1.25	0.30	23	24.9
	3	14	06	21.21	6.18	10	51	56.7	32.3	29.334	12	253	1.25	0.30	23	20.9
	4	14	06	15.03	6.15	10	51	24.4	32.2	29.336	65	281	1.25	0.30	23	16.8
	5	14	06	08.88	6.13	10	50	52.2	32.0	29.339	46	310	1.25	0.30	23	12.8
	6	14	06	02.75	-6.11	-10	50	20.2	+31.7	29.342	56	+340	1.25	0.30	23	08.8
	7	14	05	56.64	6.07	10	49	48.5	31.6	29.345	96	369	1.25	0.30	23	04.7
	8	14	05	50.57	6.05	10	49	16.9	31.3	29.349	65	396	1.25	0.30	23	00.7
	9	14	05	44.52	6.01	10	48	45.6	31.1	29.353	61	426	1.25	0.30	22	56.7
	10	14	05	38.51	5.98	10	48	14.5	30.9	29.357	87	455	1.25	0.30	22	52.6
	11	14	05	32.53	-5.94	-10	47	43.6	+30.6	29.362	42	+482	1.25	0.30	22	48.6
	12	14	05	26.59	5.90	10	47	13.0	30.3	29.367	24	510	1.24	0.30	22	44.6
	13	14	05	20.69	5.85	10	46	42.7	30.1	29.372	34	539	1.24	0.30	22	40.5
	14	14	05	14.84	5.82	10	46	12.6	29.7	29.377	73	567	1.24	0.30	22	36.5
	15	14	05	09.02	5.76	10	45	42.9	29.4	29.383	40	595	1.24	0.30	22	32.5
	16	14	05	03.26	-5.72	-10	45	13.5	+29.2	29.389	35	+621	1.24	0.30	22	28.5
	17	14	04	57.54		-10	44	44.3		29.395	56		1.24	0.30	22	24.4

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth	Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich
	h	m	s	^s	°	'	"	["]		"	"	h m
May 17	14	04	57.54	-5.67	-10	44	44.3	+28.8	29.395 56	+ 650	1.24	22 24.4
18	14	04	51.87	5.61	10	44	15.5	28.5	29.402 06	676	1.24	22 20.4
19	14	04	46.26	5.56	10	43	47.0	28.1	29.408 82	703	1.24	22 16.4
20	14	04	40.70	5.50	10	43	18.9	27.8	29.415 85	730	1.24	22 12.4
21	14	04	35.20	5.44	10	42	51.1	27.3	29.423 15	756	1.24	22 08.3
22	14	04	29.76	-5.37	-10	42	23.8	+27.0	29.430 71	+ 782	1.24	22 04.3
23	14	04	24.39	5.32	10	41	56.8	26.6	29.438 53	809	1.24	22 00.3
24	14	04	19.07	5.24	10	41	30.2	26.2	29.446 62	833	1.24	21 56.3
25	14	04	13.83	5.18	10	41	04.0	25.8	29.454 95	859	1.24	21 52.3
26	14	04	08.65	5.11	10	40	38.2	25.4	29.463 54	884	1.24	21 48.3
27	14	04	03.54	-5.04	-10	40	12.8	+24.9	29.472 38	+ 907	1.24	21 44.2
28	14	03	58.50	4.96	10	39	47.9	24.5	29.481 45	933	1.24	21 40.2
29	14	03	53.54	4.89	10	39	23.4	24.1	29.490 78	956	1.24	21 36.2
30	14	03	48.65	4.80	10	38	59.3	23.5	29.500 34	980	1.24	21 32.2
31	14	03	43.85	4.74	10	38	35.8	23.1	29.510 14	1003	1.24	21 28.2
June 1	14	03	39.11	-4.65	-10	38	12.7	+22.7	29.520 17	+1026	1.24	21 24.2
2	14	03	34.46	4.57	10	37	50.0	22.1	29.530 43	1048	1.24	21 20.2
3	14	03	29.89	4.49	10	37	27.9	21.7	29.540 91	1072	1.24	21 16.2
4	14	03	25.40	4.41	10	37	06.2	21.1	29.551 63	1093	1.24	21 12.2
5	14	03	20.99	4.32	10	36	45.1	20.7	29.562 56	1114	1.24	21 08.2
6	14	03	16.67	-4.23	-10	36	24.4	+20.2	29.573 70	+1138	1.24	21 04.2
7	14	03	12.44	4.14	10	36	04.2	19.6	29.585 08	1157	1.24	21 00.2
8	14	03	08.30	4.05	10	35	44.6	19.1	29.596 65	1179	1.24	20 56.2
9	14	03	04.25	3.96	10	35	25.5	18.6	29.608 44	1198	1.23	20 52.2
10	14	03	00.29	3.86	10	35	06.9	17.9	29.620 42	1219	1.23	20 48.2
11	14	02	56.43	-3.77	-10	34	49.0	+17.5	29.632 61	+1239	1.23	20 44.2
12	14	02	52.66	3.67	10	34	31.5	16.9	29.645 00	1258	1.23	20 40.2
13	14	02	48.99	3.58	10	34	14.6	16.4	29.657 58	1278	1.23	20 36.2
14	14	02	45.41	3.48	10	33	58.2	15.7	29.670 36	1296	1.23	20 32.2
15	14	02	41.93	3.37	10	33	42.5	15.2	29.683 32	1315	1.23	20 28.2
16	14	02	38.56	-3.27	-10	33	27.3	+14.6	29.696 47	+1332	1.23	20 24.2
17	14	02	35.29	3.17	10	33	12.7	14.0	29.709 79	1350	1.23	20 20.2
18	14	02	32.12	3.05	10	32	58.7	13.4	29.723 29	1367	1.23	20 16.2
19	14	02	29.07	2.96	10	32	45.3	12.8	29.736 96	1383	1.23	20 12.3
20	14	02	26.11	2.85	10	32	32.5	12.2	29.750 79	1399	1.23	20 08.3
21	14	02	23.26	-2.74	-10	32	20.3	+11.6	29.764 78	+1415	1.23	20 04.3
22	14	02	20.52	2.63	10	32	08.7	10.9	29.778 93	1431	1.23	20 00.3
23	14	02	17.89	2.52	10	31	57.8	10.4	29.793 24	1444	1.23	19 56.4
24	14	02	15.37	2.41	10	31	47.4	9.6	29.807 68	1459	1.23	19 52.4
25	14	02	12.96	2.29	10	31	37.8	9.1	29.822 27	1474	1.23	19 48.4
26	14	02	10.67	-2.19	-10	31	28.7	+ 8.5	29.837 01	+1486	1.23	19 44.5
27	14	02	08.48	2.07	10	31	20.2	7.8	29.851 87	1499	1.22	19 40.5
28	14	02	06.41	1.95	10	31	12.4	7.1	29.866 86	1513	1.22	19 36.5
29	14	02	04.46	1.84	10	31	05.3	6.6	29.881 99	1523	1.22	19 32.6
30	14	02	02.62	1.73	10	30	58.7	5.9	29.897 22	1535	1.22	19 28.6
July 1	14	02	00.89	-1.62	-10	30	52.8	+ 5.2	29.912 57	+1549	1.22	19 24.6
2	14	01	59.27		-10	30	47.6		29.928 06		1.22	19 20.7

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME															Transit, Meridian of Green- wich	
Date		Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax			
		h	m	s	s	°	'	"	"			"	"	h	m	
July	1	14	02	00.89	-1.62	-10	30	52.8	+ 5.2	29.912	57	+1549	1.22	0.29	19	24.6
	2	14	01	59.27	1.49	10	30	47.6	4.6	29.928	06	1557	1.22	0.29	19	20.7
	3	14	01	57.78	1.38	10	30	43.0	4.0	29.943	63	1568	1.22	0.29	19	16.7
	4	14	01	56.40	1.26	10	30	39.0	3.2	29.959	31	1579	1.22	0.29	19	12.8
	5	14	01	55.14	1.14	10	30	35.8	2.6	29.975	10	1588	1.22	0.29	19	08.8
	6	14	01	54.00	-1.03	-10	30	33.2	+ 2.1	29.990	98	+1597	1.22	0.29	19	04.9
	7	14	01	52.97	0.90	10	30	31.1	1.3	30.006	95	1606	1.22	0.29	19	00.9
	8	14	01	52.07	0.78	10	30	29.8	+ 0.6	30.023	01	1615	1.22	0.29	18	57.0
	9	14	01	51.29	0.66	10	30	29.2	0.0	30.039	16	1622	1.22	0.29	18	53.0
	10	14	01	50.63	0.54	10	30	29.2	- 0.7	30.055	38	1630	1.22	0.29	18	49.1
	11	14	01	50.09	-0.43	-10	30	29.9	- 1.4	30.071	68	+1636	1.22	0.29	18	45.2
	12	14	01	49.66	0.29	10	30	31.3	2.0	30.088	04	1643	1.22	0.29	18	41.2
	13	14	01	49.37	0.18	10	30	33.3	2.7	30.104	47	1649	1.21	0.29	18	37.3
	14	14	01	49.19	-0.06	10	30	36.0	3.3	30.120	96	1655	1.21	0.29	18	33.4
	15	14	01	49.13	+0.08	10	30	39.3	4.0	30.137	51	1660	1.21	0.29	18	29.4
	16	14	01	49.21	+0.19	-10	30	43.3	- 4.7	30.154	11	+1664	1.21	0.29	18	25.5
	17	14	01	49.40	0.31	10	30	48.0	5.4	30.170	75	1668	1.21	0.29	18	21.6
	18	14	01	49.71	0.44	10	30	53.4	6.0	30.187	43	1672	1.21	0.29	18	17.6
	19	14	01	50.15	0.57	10	30	59.4	6.7	30.204	15	1674	1.21	0.29	18	13.7
	20	14	01	50.72	0.68	10	31	06.1	7.4	30.220	89	1678	1.21	0.29	18	09.8
21	14	01	51.40	+0.81	-10	31	13.5	- 8.0	30.237	67	+1679	1.21	0.29	18	05.9	
22	14	01	52.21	0.94	10	31	21.5	8.7	30.254	46	1680	1.21	0.29	18	02.0	
23	14	01	53.15	1.06	10	31	30.2	9.4	30.271	26	1682	1.21	0.29	17	58.0	
24	14	01	54.21	1.18	10	31	39.6	10.0	30.288	08	1682	1.21	0.29	17	54.1	
25	14	01	55.39	1.30	10	31	49.6	10.7	30.304	90	1682	1.21	0.29	17	50.2	
26	14	01	56.69	+1.43	-10	32	00.3	-11.3	30.321	72	+1682	1.21	0.29	17	46.3	
27	14	01	58.12	1.55	10	32	11.6	12.0	30.338	54	1681	1.21	0.29	17	42.4	
28	14	01	59.67	1.67	10	32	23.6	12.7	30.355	35	1680	1.20	0.29	17	38.5	
29	14	02	01.34	1.79	10	32	36.3	13.2	30.372	15	1678	1.20	0.29	17	34.6	
30	14	02	03.13	1.91	10	32	49.5	14.0	30.388	93	1676	1.20	0.29	17	30.7	
Aug.	31	14	02	05.04	+2.03	-10	33	03.5	-14.5	30.405	69	+1673	1.20	0.29	17	26.8
	1	14	02	07.07	2.16	10	33	18.0	15.2	30.422	42	1671	1.20	0.29	17	22.9
	2	14	02	09.23	2.27	10	33	33.2	15.9	30.439	13	1667	1.20	0.29	17	19.0
	3	14	02	11.50	2.40	10	33	49.1	16.4	30.455	80	1662	1.20	0.29	17	15.1
	4	14	02	13.90	2.51	10	34	05.5	17.2	30.472	42	1659	1.20	0.29	17	11.2
	5	14	02	16.41	+2.63	-10	34	22.7	-17.7	30.489	01	+1655	1.20	0.29	17	07.3
	6	14	02	19.04	2.75	10	34	40.4	18.3	30.505	56	1649	1.20	0.29	17	03.4
	7	14	02	21.79	2.88	10	34	58.7	19.0	30.522	05	1643	1.20	0.29	16	59.6
	8	14	02	24.67	2.98	10	35	17.7	19.6	30.538	48	1638	1.20	0.29	16	55.7
	9	14	02	27.65	3.11	10	35	37.3	20.2	30.554	86	1630	1.20	0.29	16	51.8
	10	14	02	30.76	+3.22	-10	35	57.5	-20.8	30.571	16	+1624	1.20	0.29	16	47.9
	11	14	02	33.98	3.34	10	36	18.3	21.4	30.587	40	1616	1.20	0.29	16	44.0
	12	14	02	37.32	3.46	10	36	39.7	22.0	30.603	56	1609	1.19	0.29	16	40.2
	13	14	02	40.78	3.57	10	37	01.7	22.6	30.619	65	1599	1.19	0.29	16	36.3
	14	14	02	44.35	3.69	10	37	24.3	23.2	30.635	64	1592	1.19	0.29	16	32.4
	15	14	02	48.04	+3.80	-10	37	47.5	-23.7	30.651	56	+1581	1.19	0.29	16	28.6
16	14	02	51.84		-10	38	11.2		30.667	37		1.19	0.29	16	24.7	

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME													Transit, Meridian of Green- wich	
Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax		
	h	m	s	s	°	'	"	"			"	"	h	m
Aug. 16	14	02	51.84		-10	38	11.2		30.667 37		1.19	0.29	16	24.7
17	14	02	55.76	+3.92	10	38	35.6	-24.4	30.683 08	+1571	1.19	0.29	16	20.8
18	14	02	59.79	4.03	10	39	00.5	24.9	30.698 70	1562	1.19	0.29	16	17.0
19	14	03	03.92	4.13	10	39	26.0	25.5	30.714 20	1550	1.19	0.29	16	13.1
20	14	03	08.18	4.26	10	39	52.1	26.1	30.729 60	1540	1.19	0.29	16	09.2
				4.35				26.6		1528				
21	14	03	12.53		-10	40	18.7		30.744 88		1.19	0.29	16	05.4
22	14	03	17.00	+4.47	10	40	45.8	-27.1	30.760 03	+1515	1.19	0.29	16	01.5
23	14	03	21.58	4.58	10	41	13.5	27.7	30.775 06	1503	1.19	0.29	15	57.7
24	14	03	26.26	4.68	10	41	41.8	28.3	30.789 96	1490	1.19	0.29	15	53.8
25	14	03	31.05	4.79	10	42	10.5	28.7	30.804 73	1477	1.19	0.29	15	50.0
				4.89				29.3		1463				
26	14	03	35.94		-10	42	39.8		30.819 36		1.19	0.29	15	46.1
27	14	03	40.93	+4.99	10	43	09.6	-29.8	30.833 85	+1449	1.19	0.29	15	42.3
28	14	03	46.02	5.09	10	43	39.8	30.2	30.848 20	1435	1.19	0.29	15	38.4
29	14	03	51.21	5.19	10	44	10.6	30.8	30.862 41	1421	1.18	0.29	15	34.6
30	14	03	56.51	5.30	10	44	41.9	31.3	30.876 46	1405	1.18	0.29	15	30.7
				5.40				31.8		1390				
31	14	04	01.91		-10	45	13.7		30.890 36		1.18	0.28	15	26.9
Sept. 1	14	04	07.40	+5.49	10	45	45.9	-32.2	30.904 09	+1373	1.18	0.28	15	23.1
2	14	04	12.99	5.59	10	46	18.6	32.7	30.917 67	1358	1.18	0.28	15	19.2
3	14	04	18.67	5.68	10	46	51.8	33.2	30.931 08	1341	1.18	0.28	15	15.4
4	14	04	24.45	5.78	10	47	25.5	33.7	30.944 32	1324	1.18	0.28	15	11.5
				5.88				34.0		1307				
5	14	04	30.33		-10	47	59.5		30.957 39		1.18	0.28	15	07.7
6	14	04	36.29	+5.96	10	48	34.0	-34.5	30.970 28	+1289	1.18	0.28	15	03.9
7	14	04	42.35	6.06	10	49	09.0	35.0	30.983 00	1272	1.18	0.28	15	00.0
8	14	04	48.50	6.15	10	49	44.4	35.4	30.995 53	1253	1.18	0.28	14	56.2
9	14	04	54.73	6.23	10	50	20.2	35.8	31.007 87	1234	1.18	0.28	14	52.4
				6.33				36.2		1215				
10	14	05	01.06		-10	50	56.4		31.020 02		1.18	0.28	14	48.6
11	14	05	07.47	+6.41	10	51	33.0	-36.6	31.031 98	+1196	1.18	0.28	14	44.7
12	14	05	13.97	6.50	10	52	10.1	37.1	31.043 73	1175	1.18	0.28	14	40.9
13	14	05	20.55	6.58	10	52	47.6	37.5	31.055 29	1156	1.18	0.28	14	37.1
14	14	05	27.21	6.66	10	53	25.3	37.7	31.066 64	1135	1.18	0.28	14	33.3
				6.75				38.2		1113				
15	14	05	33.96		-10	54	03.5		31.077 77		1.18	0.28	14	29.5
16	14	05	40.77	+6.81	10	54	42.0	-38.5	31.088 70	+1093	1.18	0.28	14	25.6
17	14	05	47.68	6.91	10	55	20.9	38.9	31.099 41	1071	1.18	0.28	14	21.8
18	14	05	54.65	6.97	10	56	00.1	39.2	31.109 89	1048	1.18	0.28	14	18.0
19	14	06	01.70	7.05	10	56	39.7	39.6	31.120 16	1027	1.17	0.28	14	14.2
				7.13				39.8		1005				
20	14	06	08.83		-10	57	19.5		31.130 21		1.17	0.28	14	10.4
21	14	06	16.02	+7.19	10	57	59.7	-40.2	31.140 01	+ 980	1.17	0.28	14	06.6
22	14	06	23.28	7.26	10	58	40.2	40.5	31.149 60	959	1.17	0.28	14	02.8
23	14	06	30.62	7.34	10	59	21.0	40.8	31.158 95	935	1.17	0.28	13	58.9
24	14	06	38.01	7.39	11	00	02.0	41.0	31.168 07	912	1.17	0.28	13	55.1
				7.46				41.4		888				
25	14	06	45.47		-11	00	43.4		31.176 95		1.17	0.28	13	51.3
26	14	06	53.00	+7.53	11	01	25.0	-41.6	31.185 59	+ 864	1.17	0.28	13	47.5
27	14	07	00.58	7.58	11	02	06.9	41.9	31.194 00	841	1.17	0.28	13	43.7
28	14	07	08.22	7.64	11	02	49.0	42.1	31.202 15	815	1.17	0.28	13	39.9
29	14	07	15.93	7.71	11	03	31.3	42.3	31.210 06	791	1.17	0.28	13	36.1
				7.76				42.6		766				
30	14	07	23.69		-11	04	13.9		31.217 72		1.17	0.28	13	32.3
Oct. 1	14	07	31.50	+7.81	11	04	56.7	-42.8	31.225 13	+ 741	1.17	0.28	13	28.5

NEPTUNE, 1958
FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Apparent Declination	True Distance from Earth	Semi- diam- eter	Hor. Paral- ax	Transit, Meridian of Green- wich
		h m s	° ' " "		"	"	h m
Oct.	1	14 07 31.50 +7.87	-11 04 56.7 -43.0	31.225 13 +716	1.17	0.28	13 28.5
	2	14 07 39.37 7.92	11 05 39.7 43.2	31.232 29 691	1.17	0.28	13 24.7
	3	14 07 47.29 7.97	11 06 22.9 43.4	31.239 20 665	1.17	0.28	13 20.9
	4	14 07 55.26 8.03	11 07 06.3 43.7	31.245 85 638	1.17	0.28	13 17.1
	5	14 08 03.29 8.06	11 07 50.0 43.7	31.252 23 614	1.17	0.28	13 13.3
	6	14 08 11.35 +8.12	-11 08 33.7 -43.9	31.258 37 +586	1.17	0.28	13 09.5
	7	14 08 19.47 8.15	11 09 17.6 44.1	31.264 23 560	1.17	0.28	13 05.7
	8	14 08 27.62 8.20	11 10 01.7 44.2	31.269 83 533	1.17	0.28	13 01.9
	9	14 08 35.82 8.24	11 10 45.9 44.4	31.275 16 506	1.17	0.28	12 58.1
	10	14 08 44.06 8.28	11 11 30.3 44.5	31.280 22 479	1.17	0.28	12 54.3
	11	14 08 52.34 +8.31	-11 12 14.8 -44.5	31.285 01 +452	1.17	0.28	12 50.5
	12	14 09 00.65 8.36	11 12 59.3 44.7	31.289 53 424	1.17	0.28	12 46.7
	13	14 09 09.01 8.38	11 13 44.0 44.9	31.293 77 397	1.17	0.28	12 42.9
	14	14 09 17.39 8.41	11 14 28.9 44.8	31.297 74 369	1.17	0.28	12 39.2
	15	14 09 25.80 8.44	11 15 13.7 45.0	31.301 43 340	1.17	0.28	12 35.4
	16	14 09 34.24 +8.46	-11 15 58.7 -45.0	31.304 83 +313	1.17	0.28	12 31.6
	17	14 09 42.70 8.50	11 16 43.7 45.0	31.307 96 285	1.17	0.28	12 27.8
	18	14 09 51.20 8.51	11 17 28.7 45.1	31.310 81 257	1.17	0.28	12 24.0
	19	14 09 59.71 8.53	11 18 13.8 45.1	31.313 38 228	1.17	0.28	12 20.2
	20	14 10 08.24 8.55	11 18 58.9 45.1	31.315 66 200	1.17	0.28	12 16.4
	21	14 10 16.79 +8.57	-11 19 44.0 -45.2	31.317 66 +171	1.17	0.28	12 12.6
	22	14 10 25.36 8.58	11 20 29.2 45.1	31.319 37 143	1.17	0.28	12 08.8
	23	14 10 33.94 8.60	11 21 14.3 45.1	31.320 80 115	1.17	0.28	12 05.0
	24	14 10 42.54 8.60	11 21 59.4 45.1	31.321 95 88	1.17	0.28	12 01.2
	25	14 10 51.14 8.62	11 22 44.5 45.1	31.322 83 57	1.17	0.28	11 57.5
	26	14 10 59.76 +8.62	-11 23 29.6 -45.0	31.323 40 + 30	1.17	0.28	11 53.7
	27	14 11 08.38 8.63	11 24 14.6 44.9	31.323 70 + 1	1.17	0.28	11 49.9
	28	14 11 17.01 8.63	11 24 59.5 44.9	31.323 71 - 27	1.17	0.28	11 46.1
	29	14 11 25.64 8.64	11 25 44.4 44.8	31.323 44 56	1.17	0.28	11 42.3
	30	14 11 34.28 8.63	11 26 29.2 44.8	31.322 88 85	1.17	0.28	11 38.5
Nov.	31	14 11 42.91 +8.63	-11 27 14.0 -44.6	31.322 03 -113	1.17	0.28	11 34.7
	1	14 11 51.54 8.63	11 27 58.6 44.5	31.320 90 142	1.17	0.28	11 30.9
	2	14 12 00.17 8.62	11 28 43.1 44.5	31.319 48 170	1.17	0.28	11 27.1
	3	14 12 08.79 8.62	11 29 27.6 44.3	31.317 78 198	1.17	0.28	11 23.4
	4	14 12 17.41 8.60	11 30 11.9 44.2	31.315 80 228	1.17	0.28	11 19.6
	5	14 12 26.01 +8.59	-11 30 56.1 -44.0	31.313 52 -256	1.17	0.28	11 15.8
	6	14 12 34.60 8.58	11 31 40.1 43.9	31.310 96 285	1.17	0.28	11 12.0
	7	14 12 43.18 8.57	11 32 24.0 43.7	31.308 11 313	1.17	0.28	11 08.2
	8	14 12 51.75 8.54	11 33 07.7 43.6	31.304 98 342	1.17	0.28	11 04.4
	9	14 13 00.29 8.53	11 33 51.3 43.3	31.301 56 370	1.17	0.28	11 00.6
	10	14 13 08.82 +8.51	-11 34 34.6 -43.2	31.297 86 -398	1.17	0.28	10 56.8
	11	14 13 17.33 8.48	11 35 17.8 43.0	31.293 88 427	1.17	0.28	10 53.0
	12	14 13 25.81 8.45	11 36 00.8 42.7	31.289 61 456	1.17	0.28	10 49.2
	13	14 13 34.26 8.42	11 36 43.5 42.5	31.285 05 483	1.17	0.28	10 45.5
	14	14 13 42.68 8.40	11 37 26.0 42.2	31.280 22 511	1.17	0.28	10 41.7
	15	14 13 51.08 +8.37	-11 38 08.2 -42.1	31.275 11 -539	1.17	0.28	10 37.9
	16	14 13 59.45	-11 38 50.3	31.269 72	1.17	0.28	10 34.1

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Apparent Declination				True Distance from Earth		Semi- diam- eter	Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	°	'	"	"					h	m
Nov. 16	14	13	59.45		-11	38	50.3		31.269 72		1.17	0.28	10	34.1
17	14	14	07.77	+8.32	11	39	32.1	-41.8	31.264 05	- 567	1.17	0.28	10	30.3
18	14	14	16.06	8.29	11	40	13.6	41.5	31.258 11	594	1.17	0.28	10	26.5
19	14	14	24.32	8.26	11	40	54.8	41.2	31.251 89	622	1.17	0.28	10	22.7
20	14	14	32.53	8.21	11	41	35.8	41.0	31.245 41	648	1.17	0.28	10	18.9
				8.17				40.6		675				
21	14	14	40.70		-11	42	16.4		31.238 66		1.17	0.28	10	15.1
22	14	14	48.82	+8.12	11	42	56.8	-40.4	31.231 64	- 702	1.17	0.28	10	11.3
23	14	14	56.90	8.08	11	43	36.8	40.0	31.224 35	729	1.17	0.28	10	07.5
24	14	15	04.93	8.03	11	44	16.5	39.7	31.216 80	755	1.17	0.28	10	03.7
25	14	15	12.92	7.99	11	44	55.9	39.4	31.209 00	780	1.17	0.28	9	59.9
				7.93				39.0		807				
26	14	15	20.85		-11	45	34.9		31.200 93		1.17	0.28	9	56.1
27	14	15	28.72	+7.87	11	46	13.6	-38.7	31.192 61	- 832	1.17	0.28	9	52.3
28	14	15	36.54	7.82	11	46	51.9	38.3	31.184 03	858	1.17	0.28	9	48.5
29	14	15	44.31	7.77	11	47	29.9	38.0	31.175 19	884	1.17	0.28	9	44.7
30	14	15	52.01	7.70	11	48	07.5	37.6	31.166 11	908	1.17	0.28	9	40.9
				7.65				37.2		934				
Dec. 1	14	15	59.66		-11	48	44.7		31.156 77		1.17	0.28	9	37.1
2	14	16	07.24	+7.58	11	49	21.5	-36.8	31.147 20	- 957	1.17	0.28	9	33.3
3	14	16	14.76	7.52	11	49	57.9	36.4	31.137 37	983	1.17	0.28	9	29.5
4	14	16	22.21	7.45	11	50	33.9	36.0	31.127 32	1005	1.17	0.28	9	25.7
5	14	16	29.60	7.39	11	51	09.6	35.7	31.117 01	1031	1.17	0.28	9	21.9
				7.32				35.1		1054				
6	14	16	36.92		-11	51	44.7		31.106 47		1.18	0.28	9	18.0
7	14	16	44.16	+7.24	11	52	19.4	-34.7	31.095 69	-1078	1.18	0.28	9	14.2
8	14	16	51.33	7.17	11	52	53.7	34.3	31.084 68	1101	1.18	0.28	9	10.4
9	14	16	58.42	7.09	11	53	27.6	33.9	31.073 45	1123	1.18	0.28	9	06.6
10	14	17	05.43	7.01	11	54	00.9	33.3	31.061 98	1147	1.18	0.28	9	02.8
				6.94				32.9		1168				
11	14	17	12.37		-11	54	33.8		31.050 30		1.18	0.28	8	59.0
12	14	17	19.23	+6.86	11	55	06.3	-32.5	31.038 40	-1190	1.18	0.28	8	55.2
13	14	17	26.00	6.77	11	55	38.2	31.9	31.026 28	1212	1.18	0.28	8	51.3
14	14	17	32.69	6.69	11	56	09.6	31.4	31.013 95	1233	1.18	0.28	8	47.5
15	14	17	39.29	6.60	11	56	40.6	31.0	31.001 41	1254	1.18	0.28	8	43.7
				6.51				30.4		1273				
16	14	17	45.80		-11	57	11.0		30.988 68		1.18	0.28	8	39.9
17	14	17	52.22	+6.42	11	57	40.9	-29.9	30.975 74	-1294	1.18	0.28	8	36.0
18	14	17	58.55	6.33	11	58	10.3	29.4	30.962 60	1314	1.18	0.28	8	32.2
19	14	18	04.79	6.24	11	58	39.2	28.9	30.949 28	1332	1.18	0.28	8	28.4
20	14	18	10.93	6.14	11	59	07.5	28.3	30.935 76	1352	1.18	0.28	8	24.5
				6.04				27.9		1370				
21	14	18	16.97		-11	59	35.4		30.922 06		1.18	0.28	8	20.7
22	14	18	22.92	+5.95	12	00	02.6	-27.2	30.908 19	-1387	1.18	0.28	8	16.9
23	14	18	28.77	5.85	12	00	29.3	26.7	30.894 13	1406	1.18	0.28	8	13.0
24	14	18	34.52	5.75	12	00	55.4	26.1	30.879 91	1422	1.18	0.28	8	09.2
25	14	18	40.18	5.66	12	01	21.0	25.6	30.865 52	1439	1.18	0.29	8	05.4
				5.54				25.0		1456				
26	14	18	45.72		-12	01	46.0		30.850 96		1.19	0.29	8	01.5
27	14	18	51.16	+5.44	12	02	10.4	-24.4	30.836 25	-1471	1.19	0.29	7	57.7
28	14	18	56.50	5.34	12	02	34.3	23.9	30.821 38	1487	1.19	0.29	7	53.8
29	14	19	01.74	5.24	12	02	57.5	23.2	30.806 36	1502	1.19	0.29	7	50.0
30	14	19	06.86	5.12	12	03	20.2	22.7	30.791 19	1517	1.19	0.29	7	46.2
				5.01				22.1		1532				
31	14	19	11.87		-12	03	42.3		30.775 87		1.19	0.29	7	42.3
32	14	19	16.78	+4.91	-12	04	03.8	-21.5	30.760 42	-1545	1.19	0.29	7	38.4

FOR 0^h UNIVERSAL TIME

Date		Heliocentric Longitude, Mean Equinox of Date	Var. per Day	Reduction to Orbit	Heliocentric Latitude	Var. per Day	Logarithm of Radius Vector	Var. per Day
		° ' "	"	"	° ' "	"		
Jan.	- 3	212 43 01.3	21.37	+14.6	+1 45 13.8	+0.10	1.481 8619	+0.9
	7	212 46 35.0	21.37	14.5	1 45 14.8	0.10	1.481 8628	0.9
	17	212 50 08.7	21.37	14.4	1 45 15.7	0.09	1.481 8636	0.9
	27	212 53 42.4	21.37	14.3	1 45 16.7	0.09	1.481 8645	0.8
Feb.	6	212 57 16.2	21.37	14.2	1 45 17.6	0.09	1.481 8653	0.8
	16	213 00 49.9	21.37	+14.1	+1 45 18.5	+0.09	1.481 8662	+0.8
	26	213 04 23.6	21.37	14.0	1 45 19.5	0.09	1.481 8670	0.8
Mar.	8	213 07 57.3	21.37	13.9	1 45 20.4	0.09	1.481 8678	0.8
	18	213 11 31.0	21.37	13.8	1 45 21.3	0.09	1.481 8686	0.8
	28	213 15 04.8	21.37	13.7	1 45 22.2	0.09	1.481 8693	0.8
Apr.	7	213 18 38.5	21.37	+13.6	+1 45 23.1	+0.09	1.481 8701	+0.8
	17	213 22 12.2	21.37	13.5	1 45 24.0	0.09	1.481 8709	0.7
	27	213 25 45.9	21.37	13.4	1 45 24.9	0.09	1.481 8716	0.7
May	7	213 29 19.6	21.37	13.3	1 45 25.8	0.09	1.481 8723	0.7
	17	213 32 53.3	21.37	13.2	1 45 26.6	0.09	1.481 8730	0.7
June	27	213 36 27.1	21.37	+13.1	+1 45 27.5	+0.09	1.481 8737	+0.7
	6	213 40 00.8	21.37	13.0	1 45 28.4	0.09	1.481 8744	0.7
	16	213 43 34.5	21.37	12.9	1 45 29.2	0.08	1.481 8751	0.7
	26	213 47 08.2	21.37	12.8	1 45 30.1	0.08	1.481 8757	0.6
July	6	213 50 41.9	21.37	12.7	1 45 30.9	0.08	1.481 8764	0.6
	16	213 54 15.6	21.37	+12.7	+1 45 31.8	+0.08	1.481 8770	+0.6
	26	213 57 49.4	21.37	12.6	1 45 32.6	0.08	1.481 8776	0.6
Aug.	5	214 01 23.1	21.37	12.5	1 45 33.4	0.08	1.481 8782	0.6
	15	214 04 56.8	21.37	12.4	1 45 34.2	0.08	1.481 8787	0.5
	25	214 08 30.5	21.37	12.3	1 45 35.0	0.08	1.481 8793	0.5
Sept.	4	214 12 04.2	21.37	+12.2	+1 45 35.8	+0.08	1.481 8798	+0.5
	14	214 15 37.9	21.37	12.1	1 45 36.6	0.08	1.481 8803	0.5
	24	214 19 11.6	21.37	12.0	1 45 37.4	0.08	1.481 8808	0.5
Oct.	4	214 22 45.3	21.37	11.9	1 45 38.2	0.08	1.481 8812	0.5
	14	214 26 19.0	21.37	11.8	1 45 39.0	0.08	1.481 8817	0.4
Nov.	24	214 29 52.8	21.37	+11.7	+1 45 39.8	+0.08	1.481 8821	+0.4
	3	214 33 26.5	21.37	11.6	1 45 40.5	0.08	1.481 8825	0.4
	13	214 37 00.2	21.37	11.5	1 45 41.3	0.07	1.481 8829	0.4
	23	214 40 33.9	21.37	11.4	1 45 42.0	0.07	1.481 8833	0.4
Dec.	3	214 44 07.5	21.37	11.3	1 45 42.8	0.07	1.481 8836	0.4
	13	214 47 41.2	21.37	+11.2	+1 45 43.5	+0.07	1.481 8840	+0.3
	23	214 51 14.9	21.37	11.1	1 45 44.2	0.07	1.481 8843	0.3
	33	214 54 48.6	21.37	+11.0	+1 45 44.9	+0.07	1.481 8846	+0.3

FOR 0^h UNIVERSAL TIME

Date	Astrometric Right Ascension 1950.0				Astrometric Declination 1950.0				True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich		
	h	m	s	s	°	'	"	"				h	m	m
Jan.	1	10	33	53.61		+21	36	20.6	33.716	10	0.26	3	53.1	
	5	10	33	42.44	-11.17	21	38	53.4	33.661	23	0.26	3	37.2	-15.9
	9	10	33	29.65	12.79	21	41	31.3	33.609	60	0.26	3	21.2	16.0
	13	10	33	15.32	14.33	21	44	13.4	33.561	44	0.26	3	05.3	15.9
	17	10	32	59.52	15.80	21	46	58.9	33.517	02	0.26	2	49.3	16.0
Feb.	21	10	32	42.36	17.16									
	25	10	32	23.96	-18.40	+21	49	46.7	33.476	55	0.26	2	33.3	
	29	10	32	04.46	19.50	21	52	35.7	33.440	26	0.26	2	17.3	-16.0
	2	10	31	43.97	20.49	21	55	25.1	33.408	32	0.26	2	01.3	16.0
	6	10	31	22.64	21.33	21	58	13.8	33.380	85	0.26	1	45.2	16.1
	10	10	31	00.60	22.04	22	01	00.8	33.357	97	0.26	1	29.1	16.1
	14	10	30	37.99	-22.61	+22	03	45.2	33.339	76	0.26	1	13.0	
	18	10	30	14.94	23.05	22	06	26.1	33.326	30	0.26	0	56.9	-16.1
	22	10	29	51.62	23.32	22	09	02.6	33.317	67	0.26	0	40.8	16.1
	26	10	29	28.19	23.43	22	11	33.6	33.313	89	0.26	0	24.7	16.1
Mar.	2	10	29	04.80	23.39	22	13	58.3	33.314	96	0.26	0	08.6	16.1
	6	10	28	41.61	-23.19									
	10	10	28	18.75	22.86	+22	16	15.9	33.320	82	0.26	23	48.4	
	14	10	27	56.35	22.40	22	18	25.7	33.331	39	0.26	23	32.3	-16.1
	18	10	27	34.57	21.78	22	20	27.0	33.346	60	0.26	23	16.2	16.1
	22	10	27	13.55	21.02	22	22	19.2	33.366	33	0.26	23	00.1	16.1
	26	10	26	53.42	-20.13	22	24	01.6	33.390	50	0.26	22	44.0	16.0
	30	10	26	34.31	19.11	+22	25	33.8	33.418	94	0.26	22	28.0	
	3	10	26	16.35	17.96	22	26	55.2	33.451	48	0.26	22	11.9	-16.1
	7	10	25	59.61	16.74	22	28	05.4	33.487	92	0.26	21	55.9	16.0
Apr.	11	10	25	44.22	15.39	22	29	04.2	33.528	01	0.26	21	39.8	16.1
	15	10	25	30.25	-13.97	22	29	51.4	33.571	54	0.26	21	23.8	15.9
	19	10	25	17.80	12.45									
	23	10	25	06.95	10.85	+22	30	26.8	33.618	27	0.26	21	07.9	-16.0
	27	10	24	57.77	9.18	22	30	50.2	33.667	98	0.26	20	51.9	15.9
					7.46	22	31	01.6	33.720	40	0.26	20	36.0	15.9
						22	31	00.9	33.775	25	0.26	20	20.1	15.9
May	1	10	24	50.31		22	30	48.2	33.832	22	0.26	20	04.2	15.9
	5	10	24	44.61	-5.70									
	9	10	24	40.69	3.92	+22	30	23.8	33.891	00	0.26	19	48.3	
	13	10	24	38.59	2.10	22	29	47.7	33.951	31	0.26	19	32.5	-15.8
	17	10	24	38.34	-0.25	22	29	00.3	34.012	85	0.26	19	16.8	15.7
					+1.61	22	28	01.7	34.075	36	0.26	19	01.0	15.8
						22	26	52.3	34.138	52	0.26	18	45.3	15.7
June	21	10	24	39.95	+3.48									
	25	10	24	43.43	5.32	+22	25	32.4	34.202	02	0.26	18	29.6	-15.7
	29	10	24	48.75	7.15	22	24	02.3	34.265	54	0.26	18	13.9	15.6
	2	10	24	55.90	8.94	22	22	22.7	34.328	77	0.26	17	58.3	15.6
	6	10	25	04.84	10.72	22	20	33.9	34.391	42	0.26	17	42.7	15.6
						22	18	36.5	34.453	22	0.26	17	27.1	15.5
July	10	10	25	15.56	+12.46				34.513	92	0.25	17	11.6	-15.5
	14	10	25	28.02	14.16	+22	16	30.9	34.573	23	0.25	16	56.1	15.5
	18	10	25	42.18	15.82	22	14	17.5	34.630	87	0.25	16	40.6	15.5
	22	10	25	58.00	17.41	22	11	57.1	34.686	56	0.25	16	25.1	15.4
	26	10	26	15.41	18.92	22	09	30.1	34.740	05	0.25	16	09.7	15.4
						22	06	57.2						
	30	10	26	34.33	+20.38				34.791	11	0.25	15	54.3	-15.4
	4	10	26	54.71		+22	04	19.1	34.839	53	0.25	15	38.9	

* Double transit, Feb. 28

The astrometric ephemeris, referred to the mean equator and equinox 1950.0, is obtained by adding the planetary aberration to the geometric ephemeris and then subtracting the fixed-star aberration, calculated by the conventional formula which neglects the portion depending on the longitude of the Earth's perihelion. The astrometric ephemeris therefore is rigorously comparable with observations that are referred to catalogue mean places of neighboring stars, it being only necessary to correct the observations for geocentric parallax.

FOR 0^h UNIVERSAL TIME

Date		Astrometric Right Ascension 1950.0			Astrometric Declination 1950.0				True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich		
		h	m	s	°	'	"	"			"	h	m	s
July	4	10	26	54.71	+22	01	36.4	-166.9	34.839	53	0.25	15	38.9	-15.4
	8	10	27	16.47	21	58	49.5	170.3	34.885	11	0.25	15	23.5	15.3
	12	10	27	39.54	21	55	59.2	173.2	34.927	64	0.25	15	08.2	15.3
	16	10	28	03.85	21	53	06.0	175.3	34.966	93	0.25	14	52.9	15.3
	20	10	28	29.32	21	50	10.7	176.7	35.002	77	0.25	14	37.6	15.3
Aug.	24	10	28	55.85	+21	47	14.0	-177.5	35.034	99	0.25	14	22.3	-15.3
	28	10	29	23.33	21	44	16.5	177.6	35.063	46	0.25	14	07.0	15.3
	1	10	29	51.68	21	41	18.9	177.1	35.088	07	0.25	13	51.7	15.2
	5	10	30	20.81	21	38	21.8	175.9	35.108	71	0.25	13	36.5	15.2
	9	10	30	50.61	21	35	25.9	174.2	35.125	27	0.25	13	21.3	15.2
	13	10	31	21.00	+21	32	31.7	-171.7	35.137	65	0.25	13	06.1	-15.3
	17	10	31	51.87	21	29	40.0	168.4	35.145	75	0.25	12	50.8	15.2
	21	10	32	23.10	21	26	51.6	164.6	35.149	53	0.25	12	35.6	15.2
	25	10	32	54.59	21	24	07.0	160.2	35.148	96	0.25	12	20.4	15.2
	29	10	33	26.22	21	21	26.8	155.0	35.144	04	0.25	12	05.2	15.2
Sept.	2	10	33	57.89	+21	18	51.8	-149.5	35.134	77	0.25	11	50.0	-15.2
	6	10	34	29.50	21	16	22.3	143.1	35.121	17	0.25	11	34.8	15.2
	10	10	35	00.94	21	13	59.2	136.3	35.103	25	0.25	11	19.6	15.2
	14	10	35	32.11	21	11	42.9	128.7	35.081	05	0.25	11	04.4	15.2
	18	10	36	02.87	21	09	34.2	120.6	35.054	63	0.25	10	49.2	15.2
	22	10	36	33.13	+21	07	33.6	-112.0	35.024	10	0.25	10	34.0	-15.3
	26	10	37	02.76	21	05	41.6	103.0	34.989	58	0.25	10	18.7	15.2
	30	10	37	31.67	21	03	58.6	93.5	34.951	21	0.25	10	03.5	15.3
	4	10	37	59.76	21	02	25.1	83.6	34.909	11	0.25	9	48.2	15.3
	8	10	38	26.93	21	01	01.5	73.0	34.863	43	0.25	9	32.9	15.3
Oct.	12	10	38	53.07	+20	59	48.5	-62.2	34.814	33	0.25	9	17.6	-15.3
	16	10	39	18.08	20	58	46.3	51.1	34.762	00	0.25	9	02.3	15.3
	20	10	39	41.85	20	57	55.2	39.5	34.706	68	0.25	8	47.0	15.4
	24	10	40	04.30	20	57	15.7	28.0	34.648	61	0.25	8	31.6	15.4
	28	10	40	25.35	20	56	47.7	16.0	34.588	03	0.25	8	16.2	15.3
Nov.	1	10	40	44.91	+20	56	31.7	-4.1	34.525	20	0.25	8	00.9	-15.4
	5	10	41	02.91	20	56	27.6	8.1	34.460	36	0.26	7	45.5	15.5
	9	10	41	19.29	20	56	35.7	20.3	34.393	77	0.26	7	30.0	15.5
	13	10	41	33.95	20	56	56.0	32.5	34.325	75	0.26	7	14.5	15.5
	17	10	41	46.83	20	57	28.5	44.6	34.256	62	0.26	6	59.0	15.8
	21	10	41	57.90	+20	58	13.1	+56.4	34.186	70	0.26	6	43.5	-15.6
	25	10	42	07.11	20	59	09.5	68.0	34.116	32	0.26	6	27.9	15.6
	29	10	42	14.43	21	00	17.5	79.4	34.045	79	0.26	6	12.3	15.7
	3	10	42	19.85	21	01	36.9	90.4	33.975	43	0.26	5	56.6	15.7
	7	10	42	23.33	21	03	07.3	101.1	33.905	56	0.26	5	40.9	15.7
Dec.	11	10	42	24.85	+21	04	48.4	+111.2	33.836	51	0.26	5	25.2	-15.7
	15	10	42	24.42	21	06	39.6	120.7	33.768	65	0.26	5	09.5	15.8
	19	10	42	22.06	21	08	40.3	129.6	33.702	32	0.26	4	53.7	15.8
	23	10	42	17.80	21	10	49.9	137.8	33.637	84	0.26	4	37.9	15.8
	27	10	42	11.68	21	13	07.7	145.2	33.575	52	0.26	4	22.1	15.9
	31	10	42	03.74	+21	15	32.9	+151.9	33.515	63	0.26	4	06.2	-15.9
	35	10	41	54.03	21	18	04.8		33.458	47	0.26	3	50.3	

The astrometric ephemeris, referred to the mean equator and equinox 1950.0, is obtained by adding the planetary aberration to the geometric ephemeris and then subtracting the fixed-star aberration, calculated by the conventional formula which neglects the portion depending on the longitude of the Earth's perihelion. The astrometric ephemeris therefore is rigorously comparable with observations that are referred to catalogue mean places of neighboring stars, it being only necessary to correct the observations for geocentric parallax.

FOR 0^h UNIVERSAL TIME

Date	Heliocentric Longitude, Mean Equinox 1950.0	Var. per Day	Reduction to Orbit	Heliocentric Latitude, Ecliptic 1950.0	Var. per Day	Logarithm of Radius Vector	Var. per Day
	° ' "	"	° ' "	° ' "	"		
(Dec. 28)	150 40 44.3	18.277	+1 17 35.2	+11 26 49.8	+4.086	1.535 5458	-85.20
Apr. 7	151 11 16.0	18.358	+1 17 45.9	+11 33 37.6	+4.070	1.534 6939	-85.18
July 16	151 41 55.9	18.440	1 17 55.3	11 40 23.8	4.054	1.533 8423	85.14
Oct. 24	152 12 44.0	18.522	1 18 03.2	11 47 08.4	4.038	1.532 9912	85.07
(Feb. 1)	152 43 40.3	18.604	+1 18 09.5	+11 53 51.3	+4.020	1.532 1409	-84.98

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Red. to Astron. Place	Apparent Declination				Red. to Astron. Place	True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s		°	'	"	'''					h	m
Jan. 0*	7	59	52.56	-50.99	-31.84	+28	58	42.1	+433.1	+1 33.7	1.655 529	-4184	5.32	1 23.0
1	7	59	01.57	52.16	31.90	29	05	55.2	431.0	1 33.1	1.651 345	3912	5.33	1 18.2
2	7	58	09.41	53.28	31.96	29	13	06.2	428.4	1 32.6	1.647 433	3637	5.34	1 13.4
3	7	57	16.13	54.34	32.02	29	20	14.6	425.5	1 32.0	1.643 796	3360	5.35	1 08.6
4	7	56	21.79	55.32	32.08	29	27	20.1	422.1	1 31.4	1.640 436	3084	5.36	1 03.8
5	7	55	26.47	-56.25	-32.14	+29	34	22.2	+418.2	+1 30.8	1.637 352	-2804	5.37	0 58.9
6	7	54	30.22	57.11	32.20	29	41	20.4	414.0	1 30.2	1.634 548	2523	5.38	0 54.0
7	7	53	33.11	57.90	32.26	29	48	14.4	409.4	1 29.6	1.632 025	2241	5.39	0 49.2
8	7	52	35.21	58.61	32.32	29	55	03.8	404.2	1 28.9	1.629 784	1959	5.40	0 44.3
9	7	51	36.60	59.26	32.38	30	01	48.0	398.8	1 28.3	1.627 825	1674	5.41	0 39.4
10	7	50	37.34	-59.83	-32.44	+30	08	26.8	+392.8	+1 27.6	1.626 151	-1389	5.41	0 34.5
11	7	49	37.51	60.32	32.49	30	14	59.6	386.5	1 26.9	1.624 762	1103	5.42	0 29.5
12	7	48	37.19	60.74	32.55	30	21	26.1	380.0	1 26.2	1.623 659	816	5.42	0 24.6
13*	7	47	36.45	61.06	32.60	30	27	46.1	372.7	1 25.4	1.622 843	528	5.42	0 19.7
14	7	46	35.39	61.30	32.66	30	33	58.8	365.4	1 24.7	1.622 315	-241	5.42	0 14.7
15	7	45	34.09	-61.47	-32.71	+30	40	04.2	+357.7	+1 24.0	1.622 074	+47	5.43	0 09.8
16	7	44	32.62	61.53	32.76	30	46	01.9	349.5	1 23.3	1.622 121	334	5.43	0 04.8
17	7	43	31.09	61.51	32.81	30	51	51.4	341.1	1 22.5	1.622 455	622	5.42	23 54.9
18	7	42	29.58	61.39	32.86	30	57	32.5	332.5	1 21.8	1.623 077	907	5.42	23 50.0
19	7	41	28.19	61.20	32.90	31	03	05.0	323.5	1 21.0	1.623 984	1192	5.42	23 45.0
20	7	40	26.99	-60.91	-32.95	+31	08	28.5	+314.3	+1 20.3	1.625 176	+1476	5.41	23 40.1
21	7	39	26.08	60.54	32.99	31	13	42.8	305.0	1 19.5	1.626 652	1758	5.41	23 35.2
22	7	38	25.54	60.06	33.03	31	18	47.8	295.4	1 18.8	1.628 410	2038	5.40	23 30.2
23	7	37	25.48	59.51	33.07	31	23	43.2	285.6	1 18.0	1.630 448	2316	5.40	23 25.3
24	7	36	25.97	58.88	33.11	31	28	28.8	275.8	1 17.2	1.632 764	2591	5.39	23 20.4
25	7	35	27.09	-58.16	-33.15	+31	33	04.6	+265.8	+1 16.5	1.635 355	+2864	5.38	23 15.5
26	7	34	28.93	57.37	33.18	31	37	30.4	255.8	1 15.8	1.638 219	3134	5.37	23 10.6
27*	7	33	31.56	56.48	33.22	31	41	46.2	245.6	1 15.0	1.641 353	3402	5.36	23 05.8
28	7	32	35.08	55.53	33.25	31	45	51.8	235.4	1 14.3	1.644 755	3665	5.35	23 00.9
29	7	31	39.55	54.51	33.28	31	49	47.2	225.2	1 13.6	1.648 420	3927	5.34	22 56.1
30	7	30	45.04	-53.41	-33.31	+31	53	32.4	+215.0	+1 12.8	1.652 347	+4183	5.33	22 51.3
31	7	29	51.63	52.25	33.33	31	57	07.4	204.8	1 12.1	1.656 530	4438	5.31	22 46.5
Feb. 1	7	28	59.38	51.02	33.36	32	00	32.2	194.7	1 11.4	1.660 968	4688	5.30	22 41.7
2	7	28	08.36	49.74	33.38	32	03	46.9	184.6	1 10.8	1.665 656	4935	5.28	22 36.9
3	7	27	18.62	48.39	33.40	32	06	51.5	174.6	1 10.1	1.670 591	5178	5.27	22 32.2
4	7	26	30.23	-47.00	-33.42	+32	09	46.1	+164.5	+1 09.4	1.675 769	+5417	5.25	22 27.5
5	7	25	43.23	45.54	33.44	32	12	30.6	154.8	1 08.8	1.681 186	5654	5.23	22 22.8
6	7	24	57.69	44.05	33.46	32	15	05.4	144.9	1 08.2	1.686 840	5885	5.22	22 18.1
7	7	24	13.64	42.50	33.47	32	17	30.3	135.3	1 07.6	1.692 725	6114	5.20	22 13.5
8*	7	23	31.14	40.91	33.48	32	19	45.6	125.7	1 07.0	1.698 839	6340	5.18	22 08.9
9	7	22	50.23	-39.26	-33.50	+32	21	51.3	+116.2	+1 06.4	1.705 179	+6560	5.16	22 04.3
10	7	22	10.97	37.59	33.50	32	23	47.5	106.8	1 05.9	1.711 739	6779	5.14	21 59.7
11	7	21	33.38	35.87	33.51	32	25	34.3	97.7	1 05.4	1.718 518	6991	5.12	21 55.2
12	7	20	57.51	34.11	33.52	32	27	12.0	88.6	1 04.8	1.725 509	7202	5.10	21 50.7
13	7	20	23.40	32.31	33.52	32	28	40.6	79.7	1 04.4	1.732 711	7407	5.08	21 46.2
14	7	19	51.09	-30.49	-33.52	+32	30	00.3	+70.9	+1 03.9	1.740 118	+7608	5.06	21 41.8
15	7	19	20.60		-33.53	+32	31	11.2		+1 03.4	1.747 726		5.04	21 37.4

Approximate magnitude 7.1

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s	s		°	'	"	"		'	"		"	h m
Feb. 15	7	19	20.60	-28.63	-33.53	+32	31	11.2	+62.3	+1	03.4	1.747 726	+7805	5.04	21 37.4
16	7	18	51.97	26.74	33.53	32	32	13.5	53.9	1	03.0	1.755 531	7997	5.01	21 33.0
17	7	18	25.23	24.83	33.52	32	33	07.4	45.6	1	02.6	1.763 528	8185	4.99	21 28.7
18	7	18	00.40	22.90	33.52	32	33	53.0	37.5	1	02.2	1.771 713	8367	4.97	21 24.3
19	7	17	37.50	20.96	33.52	32	34	30.5	29.7	1	01.9	1.780 080	8546	4.94	21 20.1
20	7	17	16.54	-18.99	-33.51	+32	35	00.2	+21.9	+1	01.6	1.788 626	+8719	4.92	21 15.8
21	7	16	57.55	17.02	33.50	32	35	22.1	14.4	1	01.3	1.797 345	8888	4.90	21 11.6
22	7	16	40.53	15.04	33.49	32	35	36.5	+7.0	1	01.0	1.806 233	9052	4.87	21 07.4
23*	7	16	25.49	13.04	33.48	32	35	43.5	-0.2	1	00.7	1.815 285	9212	4.85	21 03.3
24	7	16	12.45	11.05	33.47	32	35	43.3	7.1	1	00.5	1.824 497	9365	4.82	20 59.1
25	7	16	01.40	9.06	-33.46	+32	35	36.2	-13.9	+1	00.3	1.833 862	+9516	4.80	20 55.1
26	7	15	52.34	7.06	33.44	32	35	22.3	20.6	1	00.1	1.843 378	9660	4.77	20 51.0
27	7	15	45.28	5.08	33.43	32	35	01.7	27.0	1	00.0	1.853 038	9801	4.75	20 47.0
28	7	15	40.20	3.09	33.41	32	34	34.7	33.3	0	59.8	1.862 839	9936	4.72	20 43.0
Mar. 1	7	15	37.11	-1.12	33.40	32	34	01.4	39.4	0	59.7	1.872 775	10069	4.70	20 39.0
2	7	15	35.99	+0.84	-33.38	+32	33	22.0	-45.4	+0	59.6	1.882 844	+10195	4.67	20 35.1
3	7	15	36.83	2.79	33.36	32	32	36.6	51.2	0	59.6	1.893 039	10318	4.65	20 31.2
4	7	15	39.62	4.73	33.34	32	31	45.4	56.9	0	59.6	1.903 357	10436	4.62	20 27.4
5	7	15	44.35	6.65	33.32	32	30	48.5	62.3	0	59.5	1.913 793	10552	4.60	20 23.5
6	7	15	51.00	8.55	33.29	32	29	46.2	67.9	0	59.6	1.924 345	10663	4.57	20 19.7
7	7	15	59.55	+10.45	-33.27	+32	28	38.3	-73.1	+0	59.6	1.935 008	+10771	4.55	20 16.0
8*	7	16	10.00	12.31	33.25	32	27	25.2	78.3	0	59.7	1.945 779	10874	4.52	20 12.3
9	7	16	22.31	14.19	33.22	32	26	06.9	83.4	0	59.8	1.956 653	10976	4.50	20 08.6
10	7	16	36.50	16.02	33.20	32	24	43.5	88.5	0	59.9	1.967 629	11072	4.47	20 04.9
11	7	16	52.52	17.85	33.17	32	23	15.0	93.3	1	00.1	1.978 701	11166	4.45	20 01.2
12	7	17	10.37	+19.67	-33.15	+32	21	41.7	-98.1	+1	00.2	1.989 867	+11256	4.42	19 57.6
13	7	17	30.04	21.46	33.12	32	20	03.6	102.9	1	00.4	2.001 123	11342	4.40	19 54.0
14	7	17	51.50	23.24	33.09	32	18	20.7	107.5	1	00.6	2.012 465	11425	4.37	19 50.5
15	7	18	14.74	25.00	33.06	32	16	33.2	112.0	1	00.8	2.023 890	11503	4.35	19 47.0
16	7	18	39.74	26.74	33.03	32	14	41.2	116.7	1	01.0	2.035 393	11579	4.32	19 43.5
17	7	19	06.48	+28.46	-33.00	+32	12	44.5	-121.0	+1	01.3	2.046 972	+11651	4.30	19 40.0
18	7	19	34.94	30.16	32.97	32	10	43.5	125.4	1	01.6	2.058 623	11719	4.27	19 36.6
19	7	20	05.10	31.84	32.94	32	08	38.1	129.7	1	01.9	2.070 342	11783	4.25	19 33.2
20	7	20	36.94	33.50	32.91	32	06	28.4	133.9	1	02.2	2.082 125	11843	4.23	19 29.8
21	7	21	10.44	35.13	32.87	32	04	14.5	138.1	1	02.6	2.093 968	11902	4.20	19 26.4
22*	7	21	45.57	+36.74	-32.84	+32	01	56.4	-142.2	+1	02.9	2.105 870	+11954	4.18	19 23.1
23	7	22	22.31	38.32	32.81	31	59	34.2	146.2	1	03.3	2.117 824	12005	4.16	19 19.8
24	7	23	00.63	39.88	32.77	31	57	08.0	150.3	1	03.7	2.129 829	12052	4.13	19 16.5
25	7	23	40.51	41.42	32.73	31	54	37.7	154.2	1	04.2	2.141 881	12096	4.11	19 13.3
26	7	24	21.93	42.93	32.70	31	52	03.5	158.2	1	04.6	2.153 977	12136	4.09	19 10.1
27	7	25	04.86	+44.40	-32.66	+31	49	25.3	-162.0	+1	05.1	2.166 113	+12172	4.06	19 06.9
28	7	25	49.26	45.87	32.63	31	46	43.3	165.9	1	05.6	2.178 285	12208	4.04	19 03.7
29	7	26	35.13	47.29	32.59	31	43	57.4	169.7	1	06.0	2.190 493	12238	4.02	19 00.5
30	7	27	22.42	48.69	32.55	31	41	07.7	173.4	1	06.6	2.202 731	12267	4.00	18 57.4
31	7	28	11.11	50.07	32.51	31	38	14.3	177.3	1	07.1	2.214 998	12292	3.97	18 54.3
Apr. 1	7	29	01.18	+51.42	-32.48	+31	35	17.0	-181.0	+1	07.6	2.227 290	+12316	3.95	18 51.2
2	7	29	52.60		-32.44	+31	32	16.0		+1	08.2	2.239 606		3.93	18 48.1

Approximate magnitude 7.5

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astron. Place	Apparent Declination				Red. to Astron. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s		°	'	"	"				
Apr.	1	7 29	01.18		-32.48	+31 35	17.0			+1 07.6	2.227 290	3.95	18 51.2
	2	7 29	52.60	+51.42	32.44	31 32	16.0	-181.0		1 08.2	2.239 606	3.93	18 48.1
	3	7 30	45.33	52.73	32.40	31 29	11.3	184.7		1 08.8	2.251 942	3.91	18 45.1
	4*	7 31	39.36	54.03	32.36	31 26	02.9	188.4		1 09.4	2.264 298	3.89	18 42.1
	5	7 32	34.66	55.30	32.32	31 22	50.7	192.2		1 10.0	2.276 670	3.87	18 39.1
				56.54				195.9					
	6	7 33	31.20		-32.28	+31 19	34.8			+1 10.6	2.289 056	3.84	18 36.1
	7	7 34	28.96	+57.76	32.24	31 16	15.1	-199.7		1 11.2	2.301 456	3.82	18 33.2
	8	7 35	27.93	58.97	32.20	31 12	51.7	203.4		1 11.8	2.313 866	3.80	18 30.2
	9	7 36	28.07	60.14	32.16	31 09	24.5	207.2		1 12.5	2.326 285	3.78	18 27.3
	10	7 37	29.37	61.30	32.11	31 05	53.6	210.9		1 13.2	2.338 710	3.76	18 24.4
				62.44				214.7					
	11	7 38	31.81		-32.07	+31 02	18.9			+1 13.9	2.351 139	3.74	18 21.5
	12	7 39	35.37	+63.56	32.03	30 58	40.4	-218.5		1 14.6	2.363 571	3.72	18 18.6
	13	7 40	40.02	64.65	31.99	30 54	58.1	222.3		1 15.3	2.376 002	3.70	18 15.8
	14	7 41	45.75	65.73	31.95	30 51	12.0	226.1		1 16.0	2.388 432	3.68	18 13.0
	15	7 42	52.54	66.79	31.90	30 47	22.1	229.9		1 16.7	2.400 857	3.67	18 10.2
				67.82				233.7					
	16	7 44	00.36		-31.86	+30 43	28.4			+1 17.4	2.413 275	3.65	18 07.4
	17	7 45	09.19	+68.83	31.82	30 39	30.9	-237.5		1 18.2	2.425 684	3.63	18 04.6
	18	7 46	19.02	69.83	31.77	30 35	29.5	241.4		1 18.9	2.438 082	3.61	18 01.8
	19*	7 47	29.82	70.80	31.73	30 31	24.4	245.1		1 19.7	2.450 467	3.59	17 59.1
	20	7 48	41.57	71.75	31.68	30 27	15.4	249.0		1 20.5	2.462 836	3.57	17 56.4
				72.69				252.9					
	21	7 49	54.26		-31.64	+30 23	02.5			+1 21.2	2.475 188	3.56	17 53.6
	22	7 51	07.85	+73.59	31.59	30 18	45.8	-256.7		1 22.0	2.487 520	3.54	17 50.9
	23	7 52	22.34	74.49	31.55	30 14	25.3	260.5		1 22.8	2.499 831	3.52	17 48.3
	24	7 53	37.69	75.35	31.50	30 10	00.9	264.4		1 23.6	2.512 118	3.50	17 45.6
	25	7 54	53.89	76.20	31.46	30 05	32.7	268.2		1 24.4	2.524 380	3.49	17 42.9
				77.02				272.0					
	26	7 56	10.91		-31.41	+30 01	00.7			+1 25.2	2.536 615	3.47	17 40.3
	27	7 57	28.74	+77.83	31.36	29 56	24.8	-275.9		1 26.0	2.548 821	3.45	17 37.7
	28	7 58	47.35	78.61	31.31	29 51	45.0	279.8		1 26.9	2.560 996	3.44	17 35.0
	29	8 00	06.73	79.38	31.27	29 47	01.3	283.7		1 27.7	2.573 140	3.42	17 32.4
	30	8 01	26.85	80.12	31.22	29 42	13.8	287.5		1 28.6	2.585 250	3.40	17 29.8
				80.84				291.4					
May	1	8 02	47.69		-31.17	+29 37	22.4			+1 29.4	2.597 326	3.39	17 27.2
	2*	8 04	09.24	+81.55	31.13	29 32	27.1	-295.3		1 30.2	2.609 367	3.37	17 24.7
	3	8 05	31.47	82.23	31.08	29 27	27.8	299.3		1 31.1	2.621 371	3.36	17 22.1
	4	8 06	54.37	82.90	31.03	29 22	24.7	303.1		1 31.9	2.633 338	3.34	17 19.6
	5	8 08	17.93	83.56	30.99	29 17	17.5	307.2		1 32.8	2.645 267	3.33	17 17.0
				84.19				311.1					
	6	8 09	42.12		-30.94	+29 12	06.4			+1 33.7	2.657 156	3.31	17 14.5
	7	8 11	06.94	+84.82	30.89	29 06	51.3	-315.1		1 34.5	2.669 004	3.30	17 12.0
	8	8 12	32.37	85.43	30.84	29 01	32.2	319.1		1 35.4	2.680 812	3.28	17 09.5
	9	8 13	58.39	86.02	30.79	28 56	09.1	323.1		1 36.3	2.692 577	3.27	17 07.0
	10	8 15	25.00	86.61	30.74	28 50	41.9	327.2		1 37.1	2.704 297	3.25	17 04.5
				87.18				331.1					
	11	8 16	52.18		-30.70	+28 45	10.8			+1 38.0	2.715 973	3.24	17 02.0
	12	8 18	19.91	+87.73	30.65	28 39	35.5	-335.3		1 38.9	2.727 602	3.23	16 59.5
	13	8 19	48.19	88.28	30.60	28 33	56.2	339.3		1 39.7	2.739 183	3.21	16 57.1
	14	8 21	16.99	88.80	30.55	28 28	12.8	343.4		1 40.6	2.750 715	3.20	16 54.6
	15	8 22	46.32	89.33	30.50	28 22	25.4	347.4		1 41.5	2.762 196	3.19	16 52.2
				89.82				351.5					
	16	8 24	16.14		-30.45	+28 16	33.9			+1 42.4	2.773 626	3.17	16 49.8
	17*	8 25	46.46	+90.32	-30.40	+28 10	38.4	-355.5		+1 43.3	2.785 003	3.16	16 47.3

Approximate magnitude 8.1

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s		°	'	"	"				
May 17*	8	25	46.46		-30.40	+28	10	38.4		+1 43.3	2.785 003		h m
18	8	27	17.25	+ 90.79	30.35	28	04	38.8	-359.6	1 44.1	2.796 325	+11322	3.16 16 47.3
19	8	28	48.51	91.26	30.30	27	58	35.1	363.7	1 45.0	2.807 591	11266	3.15 16 44.9
20	8	30	20.22	91.71	30.25	27	52	27.4	367.7	1 45.9	2.818 801	11210	3.13 16 42.5
21	8	31	52.36	92.14	30.20	27	46	15.7	371.7	1 46.8	2.829 952	11151	3.12 16 40.1
				92.57					375.8			11091	3.11 16 37.7
22	8	33	24.93		-30.15	+27	39	59.9		+1 47.6	2.841 043		3.10 16 35.3
23	8	34	57.91	+ 92.98	30.10	27	33	40.1	-379.8	1 48.5	2.852 074	+11031	3.09 16 32.9
24	8	36	31.28	93.37	30.05	27	27	16.3	383.8	1 49.4	2.863 043	10969	3.07 16 30.5
25	8	38	05.04	93.76	30.00	27	20	48.5	387.8	1 50.3	2.873 949	10906	3.06 16 28.2
26	8	39	39.17	94.13	29.95	27	14	16.7	391.8	1 51.1	2.884 791	10842	3.05 16 25.8
				94.48					395.7			10778	
27	8	41	13.65		-29.90	+27	07	41.0		+1 52.0	2.895 569		3.04 16 23.4
28	8	42	48.48	+ 94.83	29.85	27	01	01.2	-399.8	1 52.9	2.906 282	+10713	3.03 16 21.1
29	8	44	23.63	95.15	29.80	26	54	17.6	403.6	1 53.7	2.916 929	10647	3.02 16 18.7
30	8	45	59.11	95.48	29.75	26	47	29.9	407.7	1 54.6	2.927 510	10581	3.01 16 16.4
31*	8	47	34.90	95.79	29.70	26	40	38.4	411.5	1 55.5	2.938 024	10514	3.00 16 14.1
				96.08					415.6			10448	
June 1	8	49	10.98		-29.66	+26	33	42.8		+1 56.3	2.948 472		2.98 16 11.7
2	8	50	47.36	+ 96.38	29.61	26	26	43.4	-419.4	1 57.2	2.958 852	+10380	2.97 16 09.4
3	8	52	24.01	96.65	29.56	26	19	40.0	423.4	1 58.0	2.969 164	10312	2.96 16 07.1
4	8	54	00.94	96.93	29.51	26	12	32.6	427.4	1 58.9	2.979 407	10243	2.95 16 04.7
5	8	55	38.13	97.19	29.46	26	05	21.3	431.3	1 59.7	2.989 582	10175	2.94 16 02.4
				97.45					435.2			10105	
6	8	57	15.58		-29.41	+25	58	06.1		+2 00.6	2.999 687		2.93 16 00.1
7	8	58	53.28	+ 97.70	29.36	25	50	47.0	-439.1	2 01.4	3.009 722	+10035	2.92 15 57.8
8	9	00	31.22	97.94	29.31	25	43	24.0	443.0	2 02.2	3.019 686	9964	2.91 15 55.5
9	9	02	09.40	98.18	29.26	25	35	57.0	447.0	2 03.1	3.029 578	9892	2.90 15 53.2
10	9	03	47.80	98.40	29.21	25	28	26.2	450.8	2 03.9	3.039 398	9820	2.90 15 50.9
				98.63					454.6			9745	
11	9	05	26.43		-29.16	+25	20	51.6		+2 04.7	3.049 143		2.89 15 48.6
12	9	07	05.28	+ 98.85	29.11	25	13	13.1	-458.5	2 05.5	3.058 815	+ 9672	2.88 15 46.3
13	9	08	44.33	99.05	29.06	25	05	30.7	462.4	2 06.3	3.068 411	9596	2.87 15 44.0
14*	9	10	23.58	99.25	29.02	24	57	44.6	466.1	2 07.1	3.077 930	9519	2.86 15 41.8
15	9	12	03.02	99.44	28.97	24	49	54.6	470.0	2 07.9	3.087 373	9443	2.85 15 39.5
				99.63					473.7			9364	
16	9	13	42.65		-28.92	+24	42	00.9		+2 08.7	3.096 737		2.84 15 37.2
17	9	15	22.45	+ 99.80	28.87	24	34	03.5	-477.4	2 09.5	3.106 023	+ 9286	2.83 15 34.9
18	9	17	02.43	99.98	28.82	24	26	02.4	481.1	2 10.3	3.115 228	9205	2.82 15 32.7
19	9	18	42.57	100.14	28.77	24	17	57.6	484.8	2 11.0	3.124 353	9125	2.82 15 30.4
20	9	20	22.86	100.29	28.73	24	09	49.2	488.4	2 11.8	3.133 397	9044	2.81 15 28.1
				100.44					492.0			8961	
21	9	22	03.30		-28.68	+24	01	37.2		+2 12.6	3.142 358		2.80 15 25.9
22	9	23	43.88	+100.58	28.63	23	53	21.5	-495.7	2 13.4	3.151 236	+ 8878	2.79 15 23.6
23	9	25	24.59	100.71	28.59	23	45	02.4	499.1	2 14.1	3.160 031	8795	2.78 15 21.3
24	9	27	05.43	100.84	28.54	23	36	39.8	502.6	2 14.9	3.168 742	8711	2.78 15 19.1
25	9	28	46.38	100.95	28.49	23	28	13.7	506.1	2 15.6	3.177 369	8627	2.77 15 16.8
				101.06					509.6			8542	
26	9	30	27.44		-28.45	+23	19	44.1		+2 16.3	3.185 911		2.76 15 14.6
27	9	32	08.60	+101.16	28.40	23	11	11.1	-513.0	2 17.0	3.194 368	+ 8457	2.75 15 12.3
28*	9	33	49.86	101.26	28.36	23	02	34.7	516.4	2 17.7	3.202 741	8373	2.75 15 10.1
29	9	35	31.21	101.35	28.31	22	53	54.9	519.8	2 18.5	3.211 028	8287	2.74 15 07.8
30	9	37	12.65	101.44	28.26	22	45	11.8	523.1	2 19.2	3.219 231	8203	2.73 15 05.6
				101.52					526.5			8117	
July 1	9	38	54.17		-28.22	+22	36	25.3		+2 19.9	3.227 348		2.73 15 03.3
2	9	40	35.77	+101.60	-28.17	+22	27	35.6	-529.7	+2 20.6	3.235 380	+ 8032	2.72 15 01.1

Approximate magnitude 8.4

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s		°	'	"	"				
July	1	9 38	54.17		-28.22	+22 36	25.3			+2 19.9	3.227 348	2.73	15 03.3
	2	9 40	35.77	+101.60	28.17	22 27	35.6	-529.7		2 20.6	3.235 380 + 8032	2.72	15 01.1
	3	9 42	17.45	101.68	28.13	22 18	42.5	533.1		2 21.3	3.243 326 7946	2.71	14 58.8
	4	9 43	59.20	101.75	28.09	22 09	46.2	536.3		2 21.9	3.251 186 7860	2.71	14 56.6
	5	9 45	41.01	101.81	28.04	22 00	46.7	539.5		2 22.6	3.258 959 7773	2.70	14 54.4
				101.89				542.8			7686		
	6	9 47	22.90		-28.00	+21 51	43.9			+2 23.3	3.266 645	2.69	14 52.1
	7	9 49	04.84	+101.94	27.96	21 42	38.0	-545.9		2 23.9	3.274 244 + 7599	2.69	14 49.9
	8	9 50	46.85	102.01	27.91	21 33	29.0	549.0		2 24.6	3.281 754 7510	2.68	14 47.6
	9	9 52	28.92	102.07	27.87	21 24	16.8	552.2		2 25.2	3.289 176 7422	2.68	14 45.4
10	9 54	11.04	+102.12		-27.83	+21 15	01.5	-555.3		+2 25.9	3.296 508 + 7332	2.67	14 43.2

Approximate magnitude 8.6

Dec.	1	13 54	21.93		-27.06	- 3 23	31.1	-499.3		+2 30.5	3.261 353	2.70	9 16.1
	2	13 55	55.76	+ 93.83	27.10	3 31	50.4	495.2		2 30.0	3.253 191 - 8162	2.71	9 13.7
	3	13 57	29.40	93.64	27.13	3 40	05.6	491.2		2 29.5	3.244 929 8262	2.71	9 11.3
	4	13 59	02.82	93.42	27.17	3 48	16.8	491.2		2 29.0	3.236 567 8362	2.72	9 08.9
	5	14 00	36.04	93.22	27.21	3 56	23.8	487.0		2 28.5	3.228 104 8463	2.73	9 06.5
				93.00				482.9			8562		
	6	14 02	09.04		-27.25	- 4 04	26.7			+2 27.9	3.219 542	2.73	9 04.2
	7	14 03	41.82	+ 92.78	27.29	4 12	25.4	-478.7		2 27.4	3.210 881 - 8661	2.74	9 01.8
	8	14 05	14.36	92.54	27.33	4 20	19.9	474.5		2 26.9	3.202 121 8760	2.75	8 59.4
	9	14 06	46.67	92.31	27.37	4 28	10.0	470.1		2 26.3	3.193 263 8858	2.76	8 57.0
	10	14 08	18.73	92.06	27.40	4 35	55.8	465.8		2 25.8	3.184 308 8955	2.76	8 54.6
				91.80				461.4			9051		
	11	14 09	50.53		-27.45	- 4 43	37.2			+2 25.2	3.175 257	2.77	8 52.1
	12	14 11	22.07	+ 91.54	27.49	4 51	14.2	-457.0		2 24.7	3.166 110 - 9147	2.78	8 49.7
	13*	14 12	53.35	91.28	27.53	4 58	46.7	452.5		2 24.1	3.156 870 9240	2.79	8 47.3
	14	14 14	24.34	90.99	27.57	5 06	14.6	447.9		2 23.6	3.147 536 9334	2.80	8 44.9
	15	14 15	55.05	90.71	27.61	5 13	38.1	443.5		2 23.0	3.138 111 9425	2.80	8 42.5
				90.41				438.9			9516		
	16	14 17	25.46		-27.65	- 5 20	57.0			+2 22.4	3.128 595	2.81	8 40.0
	17	14 18	55.58	+ 90.12	27.69	5 28	11.3	-434.3		2 21.8	3.118 990 - 9605	2.82	8 37.6
	18	14 20	25.40	89.82	27.74	5 35	21.0	429.7		2 21.3	3.109 297 9693	2.83	8 35.1
	19	14 21	54.90	89.50	27.78	5 42	26.0	425.0		2 20.7	3.099 516 9781	2.84	8 32.7
	20	14 23	24.08	89.18	27.82	5 49	26.3	420.3		2 20.1	3.089 649 9867	2.85	8 30.2
				88.87				417.6			9952		
	21	14 24	52.95		-27.87	- 5 56	21.9			+2 19.5	3.079 697	2.86	8 27.8
	22	14 26	21.48	+ 88.53	27.91	6 03	12.8	-410.9		2 18.9	3.069 661 -10036	2.87	8 25.3
	23	14 27	49.67	88.19	27.95	6 09	59.0	406.2		2 18.3	3.059 541 10120	2.88	8 22.8
	24	14 29	17.52	87.85	28.00	6 16	40.3	401.3		2 17.7	3.049 339 10202	2.89	8 20.4
	25	14 30	45.02	87.50	28.04	6 23	16.8	396.5		2 17.1	3.039 056 10283	2.90	8 17.9
				87.13				391.7			10364		
	26	14 32	12.15		-28.08	- 6 29	48.5			+2 16.5	3.028 692	2.91	8 15.4
	27	14 33	38.92	+ 86.77	28.13	6 36	15.4	-386.9		2 15.9	3.018 249 -10443	2.92	8 12.9
	28*	14 35	05.32	86.40	28.17	6 42	37.3	381.9		2 15.3	3.007 726 10523	2.93	8 10.4
	29	14 36	31.33	86.01	28.22	6 48	54.4	377.1		2 14.7	2.997 126 10600	2.94	8 07.9
	30	14 37	56.95	85.62	28.26	6 55	06.5	372.1		2 14.1	2.986 448 10678	2.95	8 05.4
				85.22				367.1			10755		
	31	14 39	22.17		-28.30	- 7 01	13.6			+2 13.5	2.975 693	2.96	8 02.9
32	14 40	46.98	+ 84.81		-28.35	- 7 07	15.7	-362.1		+2 12.9	2.964 862 -10831	2.97	8 00.3

Approximate magnitude 8.6

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s	s		°	'	"	"		'	"		"	h m
Jan. 0	2	20	40.16		-22.75	-25	17	22.4		-2	01.2	2.021 911		4.35	19 41.0
1	2	20	57.06	+16.90	22.75	25	09	00.9	+501.5	2	01.0	2.029 968	+8057	4.33	19 37.4
2	2	21	15.56	18.50	22.75	25	00	28.5	512.4	2	00.8	2.038 046	8078	4.32	19 33.8
3	2	21	35.66	20.10	22.75	24	51	45.5	523.0	2	00.6	2.046 142	8096	4.30	19 30.2
4	2	21	57.34	21.68	22.76	24	42	52.2	533.3	2	00.4	2.054 254	8112	4.28	19 26.7
				23.25					543.2				8126		
5	2	22	20.59		-22.76	-24	33	49.0		-2	00.1	2.062 380		4.27	19 23.2
6	2	22	45.38	+24.79	22.76	24	24	36.3	+552.7	1	59.8	2.070 518	+8138	4.25	19 19.7
7*	2	23	11.72	26.34	22.77	24	15	14.2	562.1	1	59.6	2.078 666	8148	4.23	19 16.2
8	2	23	39.57	27.85	22.77	24	05	43.1	571.1	1	59.3	2.086 822	8156	4.22	19 12.7
9	2	24	08.93	29.36	22.77	23	56	03.2	579.9	1	59.0	2.094 984	8162	4.20	19 09.3
				30.85					588.3				8167		
10	2	24	39.78		-22.78	-23	46	14.9		-1	58.7	2.103 151		4.18	19 05.9
11	2	25	12.12	+32.34	22.78	23	36	18.4	+596.5	1	58.5	2.111 320	+8169	4.17	19 02.5
12	2	25	45.93	33.81	22.78	23	26	14.0	604.4	1	58.2	2.119 490	8170	4.15	18 59.2
13	2	26	21.19	35.26	22.79	23	16	01.9	612.1	1	57.9	2.127 659	8169	4.14	18 55.9
14	2	26	57.90	36.71	22.79	23	05	42.5	619.4	1	57.5	2.135 825	8166	4.12	18 52.5
				38.13					626.6				8162		
15	2	27	36.03		-22.79	-22	55	15.9		-1	57.2	2.143 987		4.10	18 49.3
16	2	28	15.59	+39.56	22.80	22	44	42.5	+633.4	1	56.9	2.152 142	+8155	4.09	18 46.0
17	2	28	56.55	40.96	22.80	22	34	02.4	640.1	1	56.5	2.160 288	8146	4.07	18 42.8
18	2	29	38.91	42.36	22.80	22	23	16.1	646.3	1	56.2	2.168 424	8136	4.06	18 39.6
19	2	30	22.64	43.73	22.81	22	12	23.6	652.5	1	55.8	2.176 548	8124	4.04	18 36.4
				45.09					658.2				8109		
20*	2	31	07.73		-22.81	-22	01	25.4		-1	55.4	2.184 657		4.03	18 33.2
21	2	31	54.18	+46.45	22.81	21	50	21.6	+663.8	1	55.0	2.192 751	+8094	4.01	18 30.1
22	2	32	41.95	47.77	22.82	21	39	12.5	669.1	1	54.6	2.200 826	8075	4.00	18 26.9
23	2	33	31.04	49.09	22.82	21	27	58.4	674.1	1	54.2	2.208 883	8057	3.98	18 23.8
24	2	34	21.43	50.39	22.83	21	16	39.4	679.0	1	53.8	2.216 918	8035	3.97	18 20.8
				51.66					683.5				8014		
25	2	35	13.09		-22.83	-21	05	15.9		-1	53.4	2.224 932		3.96	18 17.7
26	2	36	06.03	+52.94	22.84	20	53	48.0	+687.9	1	53.0	2.232 921	+7989	3.94	18 14.7
27	2	37	00.21	54.18	22.84	20	42	15.9	692.1	1	52.6	2.240 885	7964	3.93	18 11.6
28	2	37	55.63	55.42	22.85	20	30	40.0	695.9	1	52.1	2.248 822	7937	3.91	18 08.7
29	2	38	52.26	56.63	22.85	20	19	00.4	699.6	1	51.7	2.256 732	7910	3.90	18 05.7
				57.82					703.2				7882		
30	2	39	50.08		-22.86	-20	07	17.2		-1	51.2	2.264 614		3.89	18 02.7
31	2	40	49.09	+59.01	22.86	19	55	30.7	+706.5	1	50.7	2.272 465	+7851	3.87	17 59.8
Feb. 1	2	41	49.26	60.17	22.87	19	43	41.1	709.6	1	50.3	2.280 286	7821	3.86	17 56.9
2	2	42	50.58	61.32	22.87	19	31	48.6	712.5	1	49.8	2.288 075	7789	3.85	17 54.0
3	2	43	53.03	62.45	22.88	19	19	53.3	715.3	1	49.2	2.295 832	7757	3.83	17 51.1
				63.57					718.0				7724		
4*	2	44	56.60		-22.89	-19	07	55.3		-1	48.8	2.303 556		3.82	17 48.2
5	2	46	01.26	+64.66	22.89	18	55	54.9	+720.4	1	48.2	2.311 247	+7691	3.81	17 45.4
6	2	47	07.02	65.76	22.90	18	43	52.2	722.7	1	47.7	2.318 905	7658	3.79	17 42.5
7	2	48	13.85	66.83	22.91	18	31	47.3	724.9	1	47.2	2.326 528	7623	3.78	17 39.7
8	2	49	21.74	67.89	22.91	18	19	40.4	726.9	1	46.6	2.334 116	7588	3.77	17 36.9
				68.94					728.9				7554		
9	2	50	30.68		-22.92	-18	07	31.5		-1	46.0	2.341 670		3.76	17 34.2
10	2	51	40.67	+69.99	22.93	17	55	21.0	+730.5	1	45.4	2.349 187	+7517	3.75	17 31.4
11	2	52	51.68	71.01	22.94	17	43	08.8	732.2	1	44.9	2.356 669	7482	3.73	17 28.7
12	2	54	03.72	72.04	22.95	17	30	55.2	733.6	1	44.3	2.364 113	7444	3.72	17 25.9
13	2	55	16.76	73.04	22.95	17	18	40.3	734.9	1	43.6	2.371 519	7406	3.71	17 23.2
				74.04					736.1				7368		
14	2	56	30.80		-22.96	-17	06	24.2		-1	43.1	2.378 887		3.70	17 20.5
15	2	57	45.83	+75.03	-22.97	-16	54	07.2	+737.0	-1	42.4	2.386 216	+7329	3.69	17 17.9

Approximate magnitude 8.1

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Red. to Astrom. Place	Apparent Declination			Red. to Astrom. Place	True Distance from Earth			Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s		°	'	"		'	"			h	m
Feb.	15	2 57	45.83		-22.97	16 54	07.2	-1 42.4	2.386	216		3.69	17	17.9
	16	2 59	01.83	+ 76.00	22.98	16 41	49.4	+737.8	1 41.8	2.393	504	+7288	3.68	17 15.2
	17*	3 00	18.80	76.97	22.99	16 29	30.8	738.6	1 41.1	2.400	752	7248	3.67	17 12.6
	18	3 01	36.72	77.92	23.00	16 17	11.8	739.0	1 40.5	2.407	959	7207	3.65	17 09.9
	19	3 02	55.58	78.86	23.01	16 04	52.3	739.5	1 39.8	2.415	123	7164	3.64	17 07.3
				79.79				739.6				7122		
	20	3 04	15.37		-23.02	-15 52	32.7	-1 39.1	2.422	245		3.63	17	04.7
	21	3 05	36.08	+ 80.71	23.03	15 40	13.0	+739.7	1 38.4	2.429	324	+7079	3.62	17 02.1
	22	3 06	57.69	81.61	23.04	15 27	53.3	739.7	1 37.8	2.436	360	7036	3.61	16 59.6
	23	3 08	20.20	82.51	23.05	15 15	33.8	739.5	1 37.0	2.443	351	6991	3.60	16 57.0
	24	3 09	43.58	83.38	23.06	15 03	14.7	739.1	1 36.3	2.450	298	6947	3.59	16 54.5
				84.26				738.7				6902		
	25	3 11	07.84		-23.08	-14 50	56.0	-1 35.6	2.457	200		3.58	16	52.0
	26	3 12	32.95	+ 85.11	23.09	14 38	38.0	+738.0	1 34.8	2.464	057	+6857	3.57	16 49.4
	27	3 13	58.91	85.96	23.10	14 26	20.6	737.4	1 34.1	2.470	869	6812	3.56	16 47.0
	28	3 15	25.69	86.78	23.11	14 14	04.2	736.4	1 33.3	2.477	635	6766	3.55	16 44.5
				87.61				735.5				6722		
	Mar. 1	3 16	53.30	88.42	23.13	14 01	48.7	734.5	1 32.5	2.484	357	6676	3.54	16 42.0
	2	3 18	21.72		-23.14	-13 49	34.2	-1 31.7	2.491	033		3.53	16	39.5
	3	3 19	50.94	+ 89.22	23.15	13 37	21.0	+733.2	1 30.9	2.497	664	+6631	3.52	16 37.1
	4*	3 21	20.95	90.01	23.17	13 25	09.1	731.9	1 30.1	2.504	249	6585	3.51	16 34.7
	5	3 22	51.73	90.78	23.18	13 12	58.5	730.6	1 29.3	2.510	791	6542	3.50	16 32.3
	6	3 24	23.28	91.55	23.20	13 00	49.4	729.1	1 28.5	2.517	288	6497	3.50	16 29.9
				92.32				727.5				6454		
	7	3 25	55.60		-23.21	-12 48	41.9	-1 27.7	2.523	742		3.49	16	27.5
	8	3 27	28.66	+ 93.06	23.23	12 36	36.0	+725.9	1 26.8	2.530	152	+6410	3.48	16 25.1
	9	3 29	02.47	93.81	23.24	12 24	32.0	724.0	1 25.9	2.536	518	6366	3.47	16 22.7
	10	3 30	37.02	94.55	23.26	12 12	29.7	722.3	1 25.0	2.542	842	6324	3.46	16 20.4
	11	3 32	12.30	95.28	23.27	12 00	29.4	720.3	1 24.1	2.549	122	6280	3.45	16 18.0
				96.02				718.2				6237		
	12	3 33	48.32		-23.29	-11 48	31.2	-1 23.3	2.555	359		3.44	16	15.7
	13	3 35	25.05	+ 96.73	23.30	11 36	35.1	+716.1	1 22.4	2.561	554	+6195	3.44	16 13.4
	14	3 37	02.49	97.44	23.32	11 24	41.4	713.7	1 21.4	2.567	705	6151	3.43	16 11.1
	15	3 38	40.64	98.15	23.34	11 12	49.9	711.5	1 20.5	2.573	813	6108	3.42	16 08.8
	16	3 40	19.49	98.85	23.35	11 01	01.0	708.9	1 19.5	2.579	877	6064	3.41	16 06.5
				99.54				706.3				6021		
	17*	3 41	59.03		-23.37	-10 49	14.7	-1 18.6	2.585	898		3.40	16	04.2
	18	3 43	39.26	+100.23	23.39	10 37	31.1	+703.6	1 17.6	2.591	876	+5978	3.40	16 02.0
	19	3 45	20.16	100.90	23.41	10 25	50.4	700.7	1 16.7	2.597	810	5934	3.39	15 59.7
	20	3 47	01.73	101.57	23.43	10 14	12.6	697.8	1 15.7	2.603	700	5890	3.38	15 57.5
	21	3 48	43.96	102.23	23.45	10 02	37.8	694.8	1 14.7	2.609	546	5846	3.37	15 55.2
				102.88				691.6				5803		
	22	3 50	26.84		-23.46	- 9 51	06.2	-1 13.7	2.615	349		3.36	15	53.0
	23	3 52	10.36	+103.52	23.48	9 39	37.8	+688.4	1 12.6	2.621	108	+5759	3.36	15 50.8
	24	3 53	54.52	104.16	23.50	9 28	12.8	685.0	1 11.6	2.626	823	5715	3.35	15 48.6
	25	3 55	39.31	104.79	23.52	9 16	51.2	681.6	1 10.6	2.632	495	5672	3.34	15 46.4
	26	3 57	24.71	105.40	23.54	9 05	33.2	678.0	1 09.5	2.638	124	5629	3.34	15 44.3
				106.02				674.3				5585		
	27	3 59	10.73		-23.56	- 8 54	18.9	-1 08.4	2.643	709		3.33	15	42.1
	28	4 00	57.34	+106.61	23.58	8 43	08.3	+670.6	1 07.4	2.649	252	+5543	3.32	15 39.9
	29	4 02	44.54	107.20	23.60	8 32	01.5	666.8	1 06.3	2.654	752	5500	3.31	15 37.8
	30	4 04	32.33	107.79	23.63	8 20	58.7	662.8	1 05.2	2.660	210	5458	3.31	15 35.6
	31	4 06	20.69	108.36	23.65	8 09	59.8	658.9	1 04.1	2.665	627	5417	3.30	15 33.5
				108.93				654.8				5375		
	Apr. 1*	4 08	09.62		-23.67	- 7 59	05.0	-1 03.0	2.671	002		3.29	15	31.4
	2	4 09	59.11	+109.49	-23.69	- 7 48	14.4	+650.6	-1 01.9	2.676	338	+5336	3.29	15 29.3

Approximate magnitude 8.3
* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Red. to Astrom. Place	Apparent Declination			Red. to Astrom. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s.	s	°	'	"	'		"	h m
Apr. 1*	4	08	09.62	+109.49	-23.67	-7	59 05.0	-1 03.0	2.671 002	3.29	15 31.4
2	4	09	59.11	110.04	23.69	7	48 14.4	1 01.9	2.676 338	3.29	15 29.3
3	4	11	49.15	110.58	23.71	7	37 28.0	1 00.7	2.681 633	3.28	15 27.2
4	4	13	39.73	111.13	23.73	7	26 45.9	0 59.6	2.686 890	3.28	15 25.1
5	4	15	30.86	111.66	23.76	7	16 08.1	0 58.4	2.692 108	3.27	15 23.0
6	4	17	22.52	+112.19	-23.78	-7	05 34.8	-0 57.2	2.697 289	3.26	15 20.9
7	4	19	14.71	112.72	23.80	6	55 06.0	0 56.1	2.702 431	3.26	15 18.9
8	4	21	07.43	113.24	23.83	6	44 41.7	0 54.9	2.707 537	3.25	15 16.8
9	4	23	00.67	113.76	23.85	6	34 22.1	0 53.7	2.712 607	3.24	15 14.8
10	4	24	54.43	114.27	23.87	6	24 07.3	0 52.5	2.717 639	3.24	15 12.7
11	4	26	48.70	+114.78	-23.90	-6	13 57.3	-0 51.3	2.722 636	3.23	15 10.7
12	4	28	43.48	115.28	23.92	6	03 52.2	0 50.0	2.727 596	3.23	15 08.7
13	4	30	38.76	115.78	23.94	5	53 52.1	0 48.8	2.732 519	3.22	15 06.7
14*	4	32	34.54	116.26	23.97	5	43 57.0	0 47.5	2.737 406	3.21	15 04.7
15	4	34	30.80	116.74	23.99	5	34 07.2	0 46.3	2.742 258	3.21	15 02.7
16	4	36	27.54	+117.23	-24.01	-5	24 22.6	-0 45.0	2.747 073	3.20	15 00.7
17	4	38	24.77	117.69	24.04	5	14 43.4	0 43.7	2.751 852	3.20	14 58.7
18	4	40	22.46	118.15	24.06	5	05 09.5	0 42.5	2.756 595	3.19	14 56.7
19	4	42	20.61	118.61	24.09	4	55 41.2	0 41.2	2.761 302	3.19	14 54.8
20	4	44	19.22	119.05	24.11	4	46 18.5	0 39.9	2.765 973	3.18	14 52.8
21	4	46	18.27	+119.50	-24.14	-4	37 01.4	-0 38.5	2.770 609	3.18	14 50.9
22	4	48	17.77	119.92	24.16	4	27 50.0	0 37.2	2.775 209	3.17	14 48.9
23	4	50	17.69	120.35	24.19	4	18 44.4	0 35.9	2.779 773	3.17	14 47.0
24	4	52	18.04	120.77	24.21	4	09 44.7	0 34.6	2.784 302	3.16	14 45.0
25	4	54	18.81	121.17	24.24	4	00 51.0	0 33.2	2.788 796	3.16	14 43.1
26	4	56	19.98	+121.58	-24.26	-3	52 03.2	-0 31.9	2.793 256	3.15	14 41.2
27	4	58	21.56	121.97	24.29	3	43 21.5	0 30.5	2.797 681	3.15	14 39.3
28	5	00	23.53	122.34	24.31	3	34 45.9	0 29.2	2.802 073	3.14	14 37.4
29*	5	02	25.87	122.74	24.33	3	26 16.4	0 27.8	2.806 431	3.14	14 35.5
30	5	04	28.61	123.10	24.36	3	17 53.2	0 26.4	2.810 757	3.13	14 33.6
May 1	5	06	31.71	+123.47	-24.39	-3	09 36.2	-0 25.0	2.815 051	3.13	14 31.7
2	5	08	35.18	123.82	24.42	3	01 25.6	0 23.6	2.819 312	3.12	14 29.8
3	5	10	39.00	124.18	24.44	2	53 21.2	0 22.2	2.823 544	3.12	14 28.0
4	5	12	43.18	124.53	24.47	2	45 23.3	0 20.8	2.827 744	3.11	14 26.1
5	5	14	47.71	124.88	24.49	2	37 31.8	0 19.4	2.831 915	3.11	14 24.2
6	5	16	52.59	+125.21	-24.52	-2	29 46.8	-0 18.0	2.836 056	3.10	14 22.4
7	5	18	57.80	125.55	24.54	2	22 08.4	0 16.6	2.840 167	3.10	14 20.5
8	5	21	03.35	125.89	24.56	2	14 36.5	0 15.1	2.844 249	3.09	14 18.7
9	5	23	09.24	+126.20	24.59	2	07 11.3	0 13.7	2.848 302	3.09	14 16.8
10	5	25	15.44		-24.62	-1	59 52.7	-0 12.2	2.852 325	3.09	14 15.0

Approximate magnitude 8.4

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

PALLAS, 1958
FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME												Transit, Meridian of Green- wich			
Date		Apparent Right Ascension			Red. to Astrom. Place	Apparent Declination			Red. to Astrom. Place	True Distance from Earth		Hor. Paral- lax			
		h	m	s	s	°	'	"	'	"		"	h	m	
Oct.	26	11	24	00.58	+112.27	-26.36	-5	06	43.7	-270.7	+2 49.8	2.862 021	-6347	3.07	9 07.8
	27	11	25	52.85	112.00	26.38	5	11	14.4	267.8	2 50.0	2.855 674	6442	3.08	9 05.7
	28	11	27	44.85	111.72	26.40	5	15	42.2	264.8	2 50.3	2.849 232	6539	3.09	9 03.6
	29	11	29	36.57	111.43	26.42	5	20	07.0	261.7	2 50.5	2.842 693	6634	3.10	9 01.6
	30	11	31	28.00	111.14	26.44	5	24	28.7	258.4	2 50.7	2.836 059	6731	3.10	8 59.5
	31*	11	33	19.14	+110.86	-26.47	-5	28	47.1	-255.0	+2 50.9	2.829 328	-6827	3.11	8 57.4
Nov.	1	11	35	10.00	110.57	26.49	5	33	02.1	251.6	2 51.1	2.822 501	6923	3.12	8 55.3
	2	11	37	00.57	110.28	26.51	5	37	13.7	247.9	2 51.3	2.815 578	7020	3.13	8 53.2
	3	11	38	50.85	109.97	26.53	5	41	21.6	244.2	2 51.5	2.808 558	7115	3.13	8 51.1
	4	11	40	40.82	109.68	26.56	5	45	25.8	240.4	2 51.7	2.801 443	7213	3.14	8 49.0
	5	11	42	30.50	+109.38	-26.58	-5	49	26.2	-236.4	+2 51.8	2.794 230	-7308	3.15	8 46.9
	6	11	44	19.88	109.06	26.61	5	53	22.6	232.3	2 52.0	2.786 922	7404	3.16	8 44.7
	7	11	46	08.94	108.75	26.63	5	57	14.9	228.0	2 52.1	2.779 518	7501	3.17	8 42.6
	8	11	47	57.69	108.42	26.66	6	01	02.9	223.7	2 52.2	2.772 017	7596	3.17	8 40.5
	9	11	49	46.11	108.10	26.68	6	04	46.6	219.2	2 52.4	2.764 421	7691	3.18	8 38.4
	10	11	51	34.21	+107.77	-26.71	-6	08	25.8	-214.5	+2 52.5	2.756 730	-7785	3.19	8 36.2
	11	11	53	21.98	107.43	26.74	6	12	00.3	209.7	2 52.6	2.748 945	7880	3.20	8 34.1
	12	11	55	09.41	107.09	26.77	6	15	30.0	204.8	2 52.7	2.741 065	7972	3.21	8 31.9
	13	11	56	56.50	106.73	26.79	6	18	54.8	199.7	2 52.8	2.733 093	8064	3.22	8 29.8
	14*	11	58	43.23	106.39	26.82	6	22	14.5	194.5	2 52.8	2.725 029	8155	3.23	8 27.6
	15	12	00	29.62	+106.02	-26.85	-6	25	29.0	-189.2	+2 52.9	2.716 874	-8245	3.24	8 25.4
	16	12	02	15.64		-26.88	-6	28	38.2		+2 53.0	2.708 629		3.25	8 23.3

Approximate magnitude 8.5
* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth		Hor. Paral- lax	Transit, Meridian of Green- wich	
	h	m	s	s	s	°	'	"	"	'	"		"	h	m
Nov. 16	12	02	15.64		-26.88	-6	28	38.2		+2	53.0	2.708 629		8	23.3
17	12	04	01.30	+105.66	26.91	6	31	42.0	-183.8	2	53.0	2.700 294	- 8335	8	21.1
18	12	05	46.60	105.30	26.94	6	34	40.1	178.1	2	53.1	2.691 872	8422	8	18.9
19	12	07	31.52	104.92	26.97	6	37	32.5	172.4	2	53.1	2.683 363	8509	8	16.7
20	12	09	16.07	104.55	27.00	6	40	19.0	166.5	2	53.2	2.674 767	8596	8	14.5
				104.18					160.6				8681		
21	12	11	00.25		-27.03	-6	42	59.6		+2	53.2	2.666 086		8	12.3
22	12	12	44.04	+103.79	27.06	6	45	34.0	-154.4	2	53.2	2.657 320	- 8766	8	10.1
23	12	14	27.44	103.40	27.09	6	48	02.2	148.2	2	53.2	2.648 470	8850	8	07.9
24	12	16	10.44	103.00	27.12	6	50	24.0	141.8	2	53.2	2.639 537	8933	8	05.6
25	12	17	53.06	102.62	27.15	6	52	39.3	135.3	2	53.2	2.630 521	9016	8	03.4
				102.21					128.7				9097		
26	12	19	35.27		-27.18	-6	54	48.0		+2	53.2	2.621 424		8	01.2
27	12	21	17.07	+101.80	27.21	6	56	49.8	-121.8	2	53.2	2.612 246	- 9178	7	58.9
28	12	22	58.46	101.39	27.24	6	58	44.7	114.9	2	53.1	2.602 987	9259	7	56.7
29*	12	24	39.43	100.97	27.28	7	00	32.6	107.9	2	53.1	2.593 649	9338	7	54.4
30	12	26	19.97	100.54	27.31	7	02	13.2	100.6	2	53.1	2.584 233	9416	7	52.2
				100.11					93.3				9495		
Dec. 1	12	28	00.08		-27.34	-7	03	46.5		+2	53.0	2.574 738		7	49.9
2	12	29	39.75	+99.67	27.37	7	05	12.3	-85.8	2	52.9	2.565 166	-9572	7	47.6
3	12	31	18.97	99.22	27.40	7	06	30.4	78.1	2	52.9	2.555 517	9649	7	45.3
4	12	32	57.73	98.76	27.43	7	07	40.7	70.3	2	52.8	2.545 792	9725	7	43.0
5	12	34	36.02	98.29	27.47	7	08	43.0	62.3	2	52.7	2.535 994	9798	7	40.7
				97.81					*54.2				9873		
6	12	36	13.83		-27.50	-7	09	37.2		+2	52.7	2.526 121		7	38.4
7	12	37	51.16	+97.33	27.53	7	10	23.1	-45.9	2	52.6	2.516 176	-9945	7	36.1
8	12	39	27.99	96.83	27.56	7	11	00.5	37.4	2	52.5	2.506 159	10017	7	33.8
9	12	41	04.31	96.32	27.60	7	11	29.2	28.7	2	52.4	2.496 073	10086	7	31.4
10	12	42	40.11	95.80	27.63	7	11	49.2	20.0	2	52.3	2.485 919	10154	7	29.1
				95.26					11.0				10221		
11	12	44	15.37		-27.66	-7	12	00.2		+2	52.2	2.475 698		7	26.7
12*	12	45	50.10	+94.73	27.70	7	12	02.0	-1.8	2	52.1	2.465 413	-10285	7	24.4
13	12	47	24.27	94.17	27.73	7	11	54.5	+7.5	2	52.0	2.455 065	10348	7	22.0
14	12	48	57.87	93.60	27.76	7	11	37.6	16.9	2	51.8	2.444 656	10409	7	19.6
15	12	50	30.91	93.04	27.79	7	11	11.0	26.6	2	51.7	2.434 188	10468	7	17.2
				92.45					36.4				10525		
16	12	52	03.36		-27.83	-7	10	34.6		+2	51.6	2.423 663		7	14.8
17	12	53	35.23	+91.87	27.86	7	09	48.2	+46.4	2	51.4	2.413 084	-10579	7	12.4
18	12	55	06.48	91.25	27.89	7	08	51.8	56.4	2	51.3	2.402 451	10633	7	10.0
19	12	56	37.13	90.65	27.92	7	07	45.0	66.8	2	51.2	2.391 766	10685	7	07.5
20	12	58	07.16	90.03	27.95	7	06	27.9	77.1	2	51.0	2.381 032	10734	7	05.1
				89.40					87.8				10783		
21	12	59	36.56		-27.98	-7	05	00.1		+2	50.9	2.370 249		7	02.7
22	13	01	05.32	+88.76	28.01	7	03	21.5	+98.6	2	50.7	2.359 421	-10828	7	00.2
23	13	02	33.42	88.10	28.05	7	01	32.1	109.4	2	50.6	2.348 548	10873	6	57.7
24	13	04	00.87	87.45	28.08	6	59	31.5	120.6	2	50.4	2.337 633	10915	6	55.2
25	13	05	27.63	86.76	28.11	6	57	19.6	131.9	2	50.3	2.326 677	10956	6	52.7
				86.08					143.2				10995		
26	13	06	53.71		-28.14	-6	54	56.4		+2	50.1	2.315 682		6	50.2
27*	13	08	19.10	+85.39	28.16	6	52	21.5	+154.9	2	49.9	2.304 650	-11032	6	47.7
28	13	09	43.77	84.67	28.19	6	49	34.8	166.7	2	49.8	2.293 582	11068	6	45.2
29	13	11	07.72	83.95	28.22	6	46	36.2	178.6	2	49.6	2.282 481	11101	6	42.6
30	13	12	30.92	83.20	28.25	6	43	25.4	190.8	2	49.4	2.271 348	11133	6	40.1
				82.46					203.1				11163		
31	13	13	53.38		-28.28	-6	40	02.3		+2	49.2	2.260 185	-11191	6	37.5
32	13	15	15.06	+81.68	-28.31	-6	36	26.7	+215.6	+2	49.1	2.248 994		6	34.9

Approximate magnitude 8.3

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astron. Place	Apparent Declination				Red. to Astron. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s		°	'	"	"				
Jan.	0	4 40	49.50	-23.95	-26.23	-1 13	46.4		+407.2	-0 47.1	1.152 825	+ 6336	7.63 22 00.2
	1	4 40	25.55	22.16	26.25	1 06	59.2		422.1	0 47.2	1.159 161	6512	7.59 21 55.9
	2	4 40	03.39	20.36	26.27	0 59	57.1		436.6	0 47.3	1.165 673	6688	7.55 21 51.7
	3	4 39	43.03	18.53	26.29	0 52	40.5		450.5	0 47.5	1.172 361	6859	7.51 21 47.4
	4	4 39	24.50	16.67	26.31	0 45	10.0		463.8	0 47.6	1.179 220	7027	7.46 21 43.2
	5	4 39	07.83	-14.80	-26.33	-0 37	26.2		+476.7	-0 47.7	1.186 247	+7195	7.42 21 39.0
	6	4 38	53.03	12.91	26.35	0 29	29.5		489.0	0 47.8	1.193 442	7358	7.37 21 34.9
	7	4 38	40.12	11.03	26.37	0 21	20.5		500.8	0 47.8	1.200 800	7521	7.33 21 30.8
	8	4 38	29.09	9.11	26.39	0 12	59.7		512.1	0 47.9	1.208 321	7679	7.28 21 26.7
	9*	4 38	19.98	7.20	26.41	-0 04	27.6		522.9	0 47.9	1.216 000	7836	7.24 21 22.6
	10	4 38	12.78	-5.27	-26.43	+0 04	15.3		+533.3	-0 47.9	1.223 836	+ 7992	7.19 21 18.6
	11	4 38	07.51	3.34	26.46	0 13	08.6		543.0	0 47.9	1.231 828	8143	7.14 21 14.6
	12	4 38	04.17	-1.40	26.48	0 22	11.6		552.3	0 47.9	1.239 971	8293	7.10 21 10.6
	13	4 38	02.77	+0.54	26.50	0 31	23.9		561.2	0 47.8	1.248 264	8441	7.05 21 06.7
	14	4 38	03.31	2.50	26.52	0 40	45.1		569.6	0 47.8	1.256 705	8586	7.00 21 02.8
	15	4 38	05.81	+4.44	-26.55	+0 50	14.7		+577.4	-0 47.7	1.265 291	+ 8729	6.95 20 59.0
	16	4 38	10.25	6.39	26.57	0 59	52.1		584.8	0 47.6	1.274 020	8868	6.91 20 55.1
	17	4 38	16.64	8.35	26.59	1 09	36.9		591.7	0 47.4	1.282 888	9006	6.86 20 51.3
	18	4 38	24.99	10.29	26.61	1 19	28.6		598.2	0 47.3	1.291 894	9139	6.81 20 47.6
	19	4 38	35.28	12.23	26.64	1 29	26.8		604.1	0 47.1	1.301 033	9271	6.76 20 43.8
	20	4 38	47.51	+14.16	-26.66	+1 39	30.9		+609.6	-0 46.9	1.310 304	+ 9400	6.72 20 40.1
	21	4 39	01.67	16.09	26.69	1 49	40.5		614.7	0 46.7	1.319 704	9525	6.67 20 36.5
	22	4 39	17.76	18.00	26.71	1 59	55.2		619.3	0 46.5	1.329 229	9648	6.62 20 32.8
	23*	4 39	35.76	19.89	26.73	2 10	14.5		623.5	0 46.3	1.338 877	9767	6.57 20 29.2
	24	4 39	55.65	21.77	26.76	2 20	38.0		627.2	0 46.0	1.348 644	9885	6.53 20 25.6
	25	4 40	17.42	+23.64	-26.78	+2 31	05.2		+630.6	-0 45.7	1.358 529	+ 9999	6.48 20 22.1
	26	4 40	41.06	25.49	26.80	2 41	35.8		633.5	0 45.4	1.368 528	10111	6.43 20 18.6
	27	4 41	06.55	27.32	26.83	2 52	09.3		636.0	0 45.1	1.378 639	10219	6.38 20 15.1
	28	4 41	33.87	29.12	26.85	3 02	45.3		638.3	0 44.7	1.388 858	10325	6.34 20 11.6
	29	4 42	02.99	30.90	26.88	3 13	23.6		640.0	0 44.4	1.399 183	10429	6.29 20 08.2
	30	4 42	33.89	+32.67	-26.91	+3 24	03.6		+641.5	-0 44.0	1.409 612	+10530	6.24 20 04.8
	31	4 43	06.56	34.40	26.93	3 34	45.1		642.6	0 43.6	1.420 142	10628	6.20 20 01.5
Feb.	1	4 43	40.96	36.13	26.95	3 45	27.7		643.3	0 43.2	1.430 770	10725	6.15 19 58.1
	2	4 44	17.09	37.81	26.98	3 56	11.0		643.9	0 42.7	1.441 495	10818	6.10 19 54.8
	3	4 44	54.90	39.47	27.00	4 06	54.9		644.0	0 42.3	1.452 313	10911	6.06 19 51.5
	4	4 45	34.37	+41.12	-27.03	+4 17	38.9		+643.8	-0 41.8	1.463 224	+11000	6.01 19 48.3
	5	4 46	15.49	42.74	27.05	4 28	22.7		643.4	0 41.3	1.474 224	11089	5.97 19 45.0
	6*	4 46	58.23	44.33	27.07	4 39	06.1		642.7	0 40.8	1.485 313	11175	5.92 19 41.9
	7	4 47	42.56	45.90	27.10	4 49	48.8		641.7	0 40.3	1.496 488	11260	5.88 19 38.7
	8	4 48	28.46	47.46	27.12	5 00	30.5		640.6	0 39.8	1.507 748	11342	5.84 19 35.5
	9	4 49	15.92	+48.99	-27.15	+5 11	11.1		+639.1	-0 39.2	1.519 090	+11424	5.79 19 32.4
	10	4 50	04.91	50.50	27.17	5 21	50.2		637.5	0 38.6	1.530 514	11503	5.75 19 29.3
	11	4 50	55.41	51.99	27.20	5 32	27.7		635.5	0 38.0	1.542 017	11581	5.71 19 26.2
	12	4 51	47.40	53.47	27.22	5 43	03.2		633.3	0 37.4	1.553 598	11656	5.66 19 23.2
	13	4 52	40.87	54.93	27.25	5 53	36.5		630.9	0 36.8	1.565 254	11729	5.62 19 20.2
	14	4 53	35.80	+56.35	-27.27	+6 04	07.4		+628.3	-0 36.2	1.576 983	+11801	5.58 19 17.1
	15	4 54	32.15		-27.29	+6 14	35.7			-0 35.5	1.588 784		5.54 19 14.2

Approximate magnitude 7.8

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME															Transit, Meridian of Green- wich	
Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth		Hor. Paral- lax			
	h	m	s	s	s	°	'	"	"	'	"		"	h	m	
Feb. 15	4	54	32.15		-27.29	+	6	14	35.7	-0	35.5	1.588 784		19	14.2	
16	4	55	29.92	+ 57.77	27.32		6	25	01.1	+625.4	0 34.8	1.600 654	+11870	5.50	19 11.2	
17	4	56	29.09	59.17	27.34		6	35	23.5	622.4	0 34.1	1.612 591	11937	5.46	19 08.3	
18	4	57	29.63	60.54	27.37		6	45	42.6	619.1	0 33.4	1.624 593	12002	5.42	19 05.4	
19*	4	58	31.51	61.88	27.39		6	55	58.3	615.7	0 32.7	1.636 658	12065	5.38	19 02.5	
				63.22						611.9			12125			
20	4	59	34.73		-27.41	+	7	06	10.2	-0	32.0	1.648 783		5.34	18 59.6	
21	5	00	39.25	+ 64.52	27.44		7	16	18.3	+608.1	0 31.2	1.660 967	+12184	5.30	18 56.8	
22	5	01	45.05	65.80	27.46		7	26	22.4	604.1	0 30.5	1.673 208	12241	5.26	18 54.0	
23	5	02	52.11	67.06	27.48		7	36	22.2	599.8	0 29.7	1.685 503	12295	5.22	18 51.2	
24	5	04	00.41	68.30	27.50		7	46	17.7	595.5	0 28.9	1.697 851	12348	5.18	18 48.4	
				69.52						590.9			12398			
25	5	05	09.93		-27.53	+	7	56	08.6	-0	28.1	1.710 249		5.15	18 45.6	
26	5	06	20.63	+ 70.70	27.55		8	05	54.7	+586.1	0 27.3	1.722 695	+12446	5.11	18 42.9	
27	5	07	32.50	71.87	27.57		8	15	36.1	581.4	0 26.4	1.735 189	12494	5.07	18 40.1	
28	5	08	45.51	73.01	27.59		8	25	12.4	576.3	0 25.6	1.747 728	12539	5.04	18 37.4	
Mar. 1	5	09	59.65	74.14	27.62		8	34	43.5	571.1	0 24.7	1.760 309	12581	5.00	18 34.7	
				75.23						565.9			12624			
2	5	11	14.88		-27.64	+	8	44	09.4	-0	23.8	1.772 933		4.96	18 32.1	
3	5	12	31.18	+ 76.30	27.66		8	53	29.8	+560.4	0 22.9	1.785 597	+12664	4.93	18 29.4	
4	5	13	48.53	77.35	27.68		9	02	44.8	555.0	0 22.0	1.798 300	12703	4.89	18 26.8	
5	5	15	06.91	78.38	27.70		9	11	54.1	549.3	0 21.1	1.811 040	12740	4.86	18 24.2	
6*	5	16	26.30	79.39	27.72		9	20	57.6	543.5	0 20.2	1.823 817	12777	4.83	18 21.6	
				80.37						537.8			12812			
7	5	17	46.67		-27.74	+	9	29	55.4	-0	19.2	1.836 629		4.79	18 19.0	
8	5	19	08.01	+ 81.34	27.77		9	38	47.2	+531.8	0 18.3	1.849 476	+12847	4.76	18 16.4	
9	5	20	30.30	82.29	27.78		9	47	32.9	525.7	0 17.3	1.862 355	12879	4.73	18 13.8	
10	5	21	53.52	83.22	27.80		9	56	12.6	519.7	0 16.3	1.875 267	12912	4.69	18 11.3	
11	5	23	17.66	84.14	27.82		10	04	46.0	513.4	0 15.3	1.888 210	12943	4.66	18 08.8	
				85.05						507.1			12973			
12	5	24	42.71		-27.84	+	10	13	13.1	-0	14.3	1.901 183		4.63	18 06.3	
13	5	26	08.64	+ 85.93	27.86		10	21	33.8	+500.7	0 13.3	1.914 184	+13001	4.60	18 03.8	
14	5	27	35.44	86.80	27.88		10	29	48.1	494.3	0 12.3	1.927 211	13027	4.57	18 01.3	
15	5	29	03.09	87.65	27.90		10	37	55.8	487.7	0 11.2	1.940 264	13053	4.54	17 58.8	
16	5	30	31.58	88.49	27.91		10	45	56.8	481.0	0 10.2	1.953 340	13076	4.51	17 56.4	
				89.32						474.3			13099			
17	5	32	00.90		-27.93	+	10	53	51.1	-0	09.1	1.966 439		4.48	17 53.9	
18	5	33	31.03	+ 90.13	27.95		11	01	38.6	+467.5	0 08.1	1.979 559	+13120	4.45	17 51.5	
19	5	35	01.95	90.92	27.97		11	09	19.2	460.6	0 07.0	1.992 697	13138	4.42	17 49.1	
20*	5	36	33.64	91.69	27.98		11	16	52.9	453.7	0 05.9	2.005 853	13156	4.39	17 46.7	
21	5	38	06.08	92.44	28.00		11	24	19.6	446.7	0 04.8	2.019 024	13171	4.36	17 44.3	
				93.19						439.5			13186			
22	5	39	39.27		-28.01	+	11	31	39.1	-0	03.7	2.032 210		4.33	17 41.9	
23	5	41	13.19	+ 93.92	28.03		11	38	51.6	+432.5	0 02.6	2.045 409	+13199	4.30	17 39.6	
24	5	42	47.81	94.62	28.04		11	45	56.8	425.2	0 01.5	2.058 618	13209	4.27	17 37.2	
25	5	44	23.12	95.31	28.06		11	52	54.8	418.0	-0 00.3	2.071 838	13220	4.25	17 34.9	
26	5	45	59.11	95.99	28.07		11	59	45.5	410.7	+0 00.8	2.085 066	13228	4.22	17 32.5	
				96.64						403.3			13234			
27	5	47	35.75		-28.09	+	12	06	28.8	+0	01.9	2.098 300		4.19	17 30.2	
28	5	49	13.03	+ 97.28	28.10		12	13	04.7	+395.9	0 03.1	2.111 540	+13240	4.17	17 27.9	
29	5	50	50.94	97.91	28.11		12	19	33.2	388.5	0 04.3	2.124 784	13244	4.14	17 25.6	
30	5	52	29.45	98.51	28.12		12	25	54.2	381.0	0 05.4	2.138 032	13248	4.12	17 23.3	
31	5	54	08.54	99.09	28.14		12	32	07.8	373.6	0 06.6	2.151 281	13249	4.09	17 21.0	
				99.67						366.0			13250			
Apr. 1	5	55	48.21		-28.15	+	12	38	13.8	+0	07.8	2.164 531		4.07	17 18.8	
2	5	57	28.44	+100.23	-28.16	+	12	44	12.2	+358.4	+0	09.0	2.177 781	+13250	4.04	17 16.5

Approximate magnitude 8.5

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension		Red. to Astrom. Place	Apparent Declination		Red. to Astrom. Place	True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich	
		h m s		s	° ' "		' "			"	h m	
Apr.	1	5 55 48.21			+12 38 13.8		+0 07.8	2.164 531		4.07	17 18.8	
	2	5 57 28.44	+100.23	-28.15	12 44 12.2	+358.4	0 09.0	2.177 781	+13250	4.04	17 16.5	
	3*	5 59 09.20	100.76	28.16	12 50 03.0	350.8	0 10.2	2.191 031	13250	4.02	17 14.3	
	4	6 00 50.49	101.29	28.17	12 55 46.3	343.3	0 11.4	2.204 278	13247	3.99	17 12.0	
	5	6 02 32.30	101.81	28.18	13 01 21.9	335.6	0 12.6	2.217 524	13246	3.97	17 09.8	
			102.30	28.19		328.0			13243			
	6	6 04 14.60		-28.20	+13 06 49.9		+0 13.8	2.230 767		3.94	17 07.5	
	7	6 05 57.39	+102.79	28.21	13 12 10.1	+320.2	0 15.0	2.244 006	+13239	3.92	17 05.3	
	8	6 07 40.66	103.27	28.22	13 17 22.8	312.7	0 16.2	2.257 240	13234	3.90	17 03.1	
	9	6 09 24.40	103.74	28.23	13 22 27.7	304.9	0 17.5	2.270 469	13229	3.88	17 00.9	
	10	6 11 08.60	104.20	28.23	13 27 24.9	297.2	0 18.7	2.283 692	13223	3.85	16 58.7	
			104.64			289.4			13214			
	11	6 12 53.24		-28.24	+13 32 14.3		+0 20.0	2.296 906		3.83	16 56.5	
	12	6 14 38.32	+105.08	28.25	13 36 56.0	+281.7	0 21.2	2.310 112	+13206	3.81	16 54.3	
	13	6 16 23.82	105.50	28.25	13 41 29.9	273.9	0 22.4	2.323 308	13196	3.79	16 52.2	
	14	6 18 09.74	105.92	28.26	13 45 56.0	266.1	0 23.7	2.336 492	13184	3.77	16 50.0	
	15	6 19 56.06	106.32	28.26	13 50 14.4	258.4	0 25.0	2.349 663	13171	3.75	16 47.8	
			106.71			250.5			13157			
	16	6 21 42.77		-28.27	+13 54 24.9		+0 26.2	2.362 820		3.72	16 45.7	
	17*	6 23 29.86	+107.09	28.27	13 58 27.6	+242.7	0 27.5	2.375 962	+13142	3.70	16 43.5	
	18	6 25 17.32	107.46	28.28	14 02 22.5	234.9	0 28.7	2.389 087	13125	3.68	16 41.4	
	19	6 27 05.14	107.82	28.28	14 06 09.6	227.1	0 30.0	2.402 194	13107	3.66	16 39.2	
	20	6 28 53.31	108.17	28.28	14 09 48.8	219.2	0 31.3	2.415 282	13088	3.64	16 37.1	
			108.50			211.5			13066			
	21	6 30 41.81		-28.29	+14 13 20.3		+0 32.5	2.428 348		3.62	16 35.0	
	22	6 32 30.63	+108.82	28.29	14 16 43.9	+203.6	0 33.8	2.441 393	+13045	3.60	16 32.9	
	23	6 34 19.76	109.13	28.29	14 19 59.7	195.8	0 35.1	2.454 415	13022	3.59	16 30.7	
	24	6 36 09.18	109.42	28.29	14 23 07.8	188.1	0 36.4	2.467 412	12997	3.57	16 28.6	
	25	6 37 58.89	109.71	28.29	14 26 08.0	180.2	0 37.6	2.480 384	12972	3.55	16 26.5	
			109.99			172.4			12944			
	26	6 39 48.88		-28.29	+14 29 00.4		+0 38.9	2.493 328		3.53	16 24.4	
	27	6 41 39.13	+110.25	28.29	14 31 45.1	+164.7	0 40.2	2.506 246	+12918	3.51	16 22.3	
	28	6 43 29.63	110.50	28.29	14 34 22.1	157.0	0 41.5	2.519 134	12888	3.49	16 20.2	
	29	6 45 20.36	110.73	28.29	14 36 51.4	149.3	0 42.8	2.531 993	12859	3.48	16 18.1	
	30	6 47 11.31	110.95	28.29	14 39 12.9	141.5	0 44.1	2.544 822	12829	3.46	16 16.0	
			111.18			133.8			12799			
May	1*	6 49 02.49		-28.28	+14 41 26.7		+0 45.4	2.557 621		3.44	16 14.0	
	2	6 50 53.86	+111.37	28.28	14 43 32.9	+126.2	0 46.6	2.570 387	+12766	3.42	16 11.9	
	3	6 52 45.44	111.58	28.28	14 45 31.5	118.6	0 47.9	2.583 122	12735	3.41	16 09.8	
	4	6 54 37.20	111.76	28.27	14 47 22.5	111.0	0 49.2	2.595 825	12703	3.39	16 07.7	
	5	6 56 29.14	111.94	28.27	14 49 05.8	103.3	0 50.5	2.608 494	12669	3.37	16 05.7	
			112.11			95.8			12635			
	6	6 58 21.25		-28.27	+14 50 41.6		+0 51.8	2.621 129		3.36	16 03.6	
	7	7 00 13.53	+112.28	28.26	14 52 09.8	+88.2	0 53.1	2.633 731	+12602	3.34	16 01.5	
	8	7 02 05.96	112.43	28.25	14 53 30.6	80.8	0 54.3	2.646 296	12565	3.33	15 59.5	
	9	7 03 58.55	112.59	28.25	14 54 43.8	73.2	0 55.6	2.658 825	12529	3.31	15 57.4	
	10	7 05 51.28	112.73	28.24	14 55 49.5	65.7	0 56.9	2.671 317	12492	3.29	15 55.3	
			112.87			58.3			12453			
	11	7 07 44.15		-28.24	+14 56 47.8		+0 58.1	2.683 770		3.28	15 53.3	
	12	7 09 37.15	+113.00	28.23	14 57 38.6	+50.8	0 59.4	2.696 183	+12413	3.26	15 51.2	
	13	7 11 30.27	113.12	28.22	14 58 22.1	43.5	1 00.7	2.708 556	12373	3.25	15 49.2	
	14	7 13 23.52	113.25	28.21	14 58 58.2	36.1	1 02.0	2.720 886	12330	3.23	15 47.1	
	15*	7 15 16.86	113.34	28.20	14 59 26.9	28.7	1 03.2	2.733 173	12287	3.22	15 45.1	
			113.45			21.4			12243			
	16	7 17 10.31		-28.19	+14 59 48.3		+1 04.5	2.745 416		3.21	15 43.0	
	17	7 19 03.86	+113.55	-28.19	+15 00 02.5	+14.2	+1 05.7	2.757 613	+12197	3.19	15 41.0	

Approximate magnitude 9.3

*On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Red. to Astrom. Place	Apparent Declination			Red. to Astrom. Place	True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s	°	'	"	'	"		"	h m
May 17	7	19	03.86		-28.19	+15	00 02.5	+1	05.7	2.757 613		15 41.0
18	7	20	57.49	+113.63	28.18	15	00 09.4	+	6.9	2.769 763	+12150	15 38.9
19	7	22	51.20	113.71	28.16	15	00 09.1	-	0.3	2.781 865	12102	15 36.9
20	7	24	44.97	113.77	28.15	15	00 01.6		7.5	2.793 918	12053	15 34.8
21	7	26	38.81	113.84	28.14	14	59 47.1		14.5	2.805 921	12003	15 32.8
				113.89					21.7		11951	
22	7	28	32.70		-28.13	+14	59 25.4	+1	12.0	2.817 872		15 30.8
23	7	30	26.64	+113.94	28.12	14	58 56.7	-	28.7	2.829 770	+11898	15 28.7
24	7	32	20.62	113.98	28.11	14	58 21.0		35.7	2.841 615	11845	15 26.7
25	7	34	14.62	114.00	28.10	14	57 38.3		42.7	2.853 405	11790	15 24.6
26	7	36	08.64	114.02	28.08	14	56 48.8		49.5	2.865 140	11735	15 22.6
				114.04					56.4		11679	
27	7	38	02.68		-28.07	+14	55 52.4	+1	18.1	2.876 819		15 20.6
28	7	39	56.71	+114.03	28.06	14	54 49.2	-	63.2	2.888 441	+11622	15 18.5
29*	7	41	50.75	114.04	28.04	14	53 39.3		69.9	2.900 006	11565	15 16.5
30	7	43	44.78	114.03	28.03	14	52 22.6		76.7	2.911 513	11507	15 14.4
31	7	45	38.79	114.01	28.01	14	50 59.3		83.3	2.922 962	11449	15 12.4
				113.99					89.9		11390	
June 1	7	47	32.78		-28.00	+14	49 29.4	+1	24.1	2.934 352		15 10.4
2	7	49	26.75	+113.97	27.98	14	47 52.9	-	96.5	2.945 683	+11331	15 08.3
3	7	51	20.68	113.93	27.97	14	46 09.9		103.0	2.956 954	11271	15 06.3
4	7	53	14.59	113.91	27.95	14	44 20.5		109.4	2.968 164	11210	15 04.2
5	7	55	08.46	113.87	27.94	14	42 24.6		115.9	2.979 313	11149	15 02.2
				113.82					122.3		11088	
6	7	57	02.28		-27.92	+14	40 22.3	+1	30.0	2.990 401		15 00.2
7	7	58	56.06	+113.78	27.90	14	38 13.7	-	128.6	3.001 425	+11024	14 58.1
8	8	00	49.80	113.74	27.88	14	35 58.8		134.9	3.012 385	10960	14 56.1
9	8	02	43.48	113.68	27.87	14	33 37.7		141.1	3.023 279	10894	14 54.0
10	8	04	37.11	113.63	27.85	14	31 10.3		147.4	3.034 108	10829	14 52.0
				113.57					153.5		10761	
11	8	06	30.68		-27.83	+14	28 36.8	+1	35.7	3.044 869		14 49.9
12	8	08	24.19	+113.51	27.81	14	25 57.2	-	159.6	3.055 562	+10693	14 47.9
13*	8	10	17.62	113.43	27.80	14	23 11.6		165.6	3.066 185	10623	14 45.8
14	8	12	10.99	113.37	27.78	14	20 20.0		171.6	3.076 738	10553	14 43.8
15	8	14	04.28	113.29	27.76	14	17 22.5		177.5	3.087 219	10481	14 41.7
				113.21					183.5		10408	
16	8	15	57.49		-27.74	+14	14 19.0	+1	41.2	3.097 627		14 39.7
17	8	17	50.61	+113.12	27.72	14	11 09.8	-	189.2	3.107 961	+10334	14 37.6
18	8	19	43.64	113.03	27.70	14	07 54.8		195.0	3.118 219	10258	14 35.6
19	8	21	36.58	112.94	27.68	14	04 34.0		200.8	3.128 402	10183	14 33.5
20	8	23	29.41	+112.83	-27.66	+14	01 07.7	+1	44.4	3.138 507	+10105	14 31.4
									-206.3			

Approximate magnitude 9.8

Nov. 10	12	20	17.58	+ 81.59	-26.63	- 1 56 25.7	-383.0	+2 52.0	3.458 294	- 7089	2.54	9 04.7
11	12	21	39.17	81.22	26.66	2 02 48.7	379.6	2 52.0	3.451 205	7207	2.55	9 02.2
12	12	23	00.39	80.86	26.68	2 09 08.3	376.2	2 51.9	3.443 988	7356	2.56	8 59.6
13	12	24	21.25	80.47	26.70	2 15 24.5	372.8	2 51.9	3.436 642	7472	2.56	8 57.0
14*	12	25	41.72	80.09	26.73	2 21 37.3	369.1	2 51.9	3.429 170	7598	2.57	8 54.4
15	12	27	01.81		-26.75	- 2 27 46.4	-365.5	+2 51.8	3.421 572	- 7721	2.57	8 51.8
16	12	28	21.52	+ 79.71	-26.78	- 2 33 51.9		+2 51.8	3.413 851		2.58	8 49.2

Approximate magnitude 10.4

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME															Transit, Meridian of Green- wich
Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth		Hor. Paral- lax		
	h	m	s	s	s	°	'	"	"	'	"		"	h	m
Nov. 16	12	28	21.52		-26.78	-2	33	51.9	-361.8	+2	51.8	3.413 851	- 7845	2.58	8 49.2
17	12	29	40.83	+79.31	26.80	2	39	53.7	358.1	2	51.7	3.406 006	7966	2.58	8 46.5
18	12	30	59.73	78.90	26.83	2	45	51.8	354.2	2	51.7	3.398 040	8087	2.59	8 43.9
19	12	32	18.24	78.51	26.86	2	51	46.0	350.3	2	51.6	3.389 953	8207	2.60	8 41.3
20	12	33	36.33	78.09	26.88	2	57	36.3	346.3	2	51.6	3.381 746	8324	2.60	8 38.6
				77.68											
21	12	34	54.01		-26.91	-3	03	22.6	-342.4	+2	51.5	3.373 422	- 8442	2.61	8 36.0
22	12	36	11.27	+77.26	26.94	3	09	05.0	338.2	2	51.4	3.364 980	8559	2.62	8 33.3
23	12	37	28.11	76.84	26.96	3	14	43.2	332.3	2	51.4	3.356 421	8674	2.62	8 30.7
24	12	38	44.51	76.40	26.99	3	20	17.3	334.1	2	51.3	3.347 747	8787	2.63	8 28.0
25	12	40	00.47	75.96	27.02	3	25	47.2	329.9	2	51.2	3.338 960	8902	2.64	8 25.3
				75.53					325.6						
26	12	41	16.00		-27.05	-3	31	12.8	-321.2	+2	51.2	3.330 058	- 9013	2.64	8 22.7
27	12	42	31.07	+75.07	27.08	3	36	34.0	316.8	2	51.1	3.321 045	9125	2.65	8 20.0
28	12	43	45.69	74.62	27.11	3	41	50.8	312.3	2	51.0	3.311 920	9235	2.66	8 17.3
29*	12	44	59.84	74.15	27.14	3	47	03.1	307.8	2	50.9	3.302 685	9344	2.66	8 14.6
30	12	46	13.53	73.69	27.17	3	52	10.9	303.1	2	50.9	3.293 341	9453	2.67	8 11.9
				73.21											
Dec. 1	12	47	26.74		-27.20	-3	57	14.0	-298.4	+2	50.8	3.283 888	- 9560	2.68	8 09.1
2	12	48	39.46	+72.72	27.23	4	02	12.4	293.6	2	50.7	3.274 328	9667	2.69	8 06.4
3	12	49	51.69	72.23	27.26	4	07	06.0	288.8	2	50.6	3.264 661	9771	2.70	8 03.7
4	12	51	03.42	71.73	27.29	4	11	54.8	283.9	2	50.5	3.254 890	9876	2.70	8 00.9
5	12	52	14.64	71.22	27.32	4	16	38.7	278.8	2	50.4	3.245 014	9979	2.71	7 58.2
				70.70											
6	12	53	25.34		-27.35	-4	21	17.5	-273.7	+2	50.3	3.235 035	-10079	2.72	7 55.4
7	12	54	35.50	+70.16	27.39	4	25	51.2	268.6	2	50.2	3.224 956	10180	2.73	7 52.6
8	12	55	45.12	69.62	27.42	4	30	19.8	263.2	2	50.1	3.214 776	10278	2.74	7 49.9
9	12	56	54.19	69.07	27.45	4	34	43.0	258.0	2	50.0	3.204 498	10374	2.75	7 47.1
10	12	58	02.70	68.51	27.48	4	39	01.0	252.5	2	49.9	3.194 124	10469	2.76	7 44.3
				67.93											
11	12	59	10.63		-27.52	-4	43	13.5	-247.0	+2	49.8	3.183 655	-10561	2.76	7 41.5
12*	13	00	17.98	+67.35	27.55	4	47	20.5	241.4	2	49.7	3.173 094	10651	2.77	7 38.7
13	13	01	24.73	66.75	27.58	4	51	21.9	235.8	2	49.6	3.162 443	10739	2.78	7 35.8
14	13	02	30.88	66.15	27.62	4	55	17.7	230.1	2	49.5	3.151 704	10825	2.79	7 33.0
15	13	03	36.41	65.53	27.65	4	59	07.8	224.2	2	49.4	3.140 879	10908	2.80	7 30.1
				64.91											
16	13	04	41.32		-27.69	-5	02	52.0	-218.4	+2	49.3	3.129 971	-10990	2.81	7 27.3
17	13	05	45.60	+64.28	27.72	5	06	30.4	212.4	2	49.2	3.118 981	11069	2.82	7 24.4
18	13	06	49.23	63.63	27.75	5	10	02.8	206.5	2	49.1	3.107 912	11146	2.83	7 21.5
19	13	07	52.21	62.98	27.79	5	13	29.3	200.3	2	49.0	3.096 766	11221	2.84	7 18.6
20	13	08	54.53	62.32	27.83	5	16	49.6	194.2	2	48.9	3.085 545	11294	2.85	7 15.7
				61.65											
21	13	09	56.18		-27.86	-5	20	03.8	-188.0	+2	48.8	3.074 251	-11366	2.86	7 12.8
22	13	10	57.15	+60.97	27.89	5	23	11.8	181.7	2	48.7	3.062 885	11434	2.87	7 09.9
23	13	11	57.42	60.27	27.93	5	26	13.5	175.3	2	48.6	3.051 451	11501	2.88	7 07.0
24	13	12	57.00	59.58	27.96	5	29	08.8	168.9	2	48.5	3.039 950	11566	2.89	7 04.0
25	13	13	55.86	58.86	28.00	5	31	57.7	162.4	2	48.4	3.028 384	11629	2.91	7 01.1
				58.14											
26	13	14	54.00		-28.03	-5	34	40.1	-155.8	+2	48.3	3.016 755	-11690	2.92	6 58.1
27*	13	15	51.40	+57.40	28.07	5	37	15.9	149.2	2	48.2	3.005 065	11748	2.93	6 55.1
28	13	16	48.06	56.66	28.10	5	39	45.1	142.4	2	48.1	2.993 317	11805	2.94	6 52.1
29	13	17	43.96	55.90	28.14	5	42	07.5	135.6	2	48.0	2.981 512	11859	2.95	6 49.1
30	13	18	39.09	55.13	28.17	5	44	23.1	128.7	2	47.9	2.969 653	11912	2.96	6 46.1
				54.35											
31	13	19	33.44		-28.21	-5	46	31.8	-121.7	+2	47.8	2.957 741	-11962	2.98	6 43.0
32	13	20	26.98	+53.54	-28.24	-5	48	33.5	-121.7	+2	47.8	2.945 779	-11962	2.99	6 40.0

Approximate magnitude 10.3
* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth		Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s	s		°	'	"	"		'	"		"	h m
Jan. 0	0	53	35.63		-25.26	-2	16	10.8		-2	36.4	2.278 117		3.86	18 14.6
1	0	54	21.97	+46.34	25.25	2	07	43.4	+507.4	2	36.2	2.291 945	+13828	3.84	18 11.4
2	0	55	09.32	47.35	25.25	1	59	11.9	511.5	2	36.0	2.305 777	13832	3.82	18 08.3
3	0	55	57.67	48.35	25.25	1	50	36.5	515.4	2	35.8	2.319 612	13835	3.79	18 05.2
4	0	56	46.99	49.32	25.25	1	41	57.2	519.3	2	35.6	2.333 447	13835	3.77	18 02.1
				50.28					523.0				13833		
5*	0	57	37.27		-25.25	-1	33	14.2		-2	35.4	2.347 280		3.75	17 59.0
6	0	58	28.49	+51.22	25.25	1	24	27.7	+526.5	2	35.2	2.361 110	+13830	3.73	17 55.9
7	0	59	20.64	52.15	25.25	1	15	37.6	530.1	2	35.0	2.374 933	13823	3.71	17 52.8
8	1	00	13.70	53.06	25.26	1	06	44.2	533.4	2	34.8	2.388 749	13816	3.68	17 49.8
9	1	01	07.66	53.96	25.26	0	57	47.5	536.7	2	34.6	2.402 555	13806	3.66	17 46.8
				54.84					539.8				13795		
10	1	02	02.50		-25.26	-0	48	47.7		-2	34.3	2.416 350		3.64	17 43.8
11	1	02	58.21	+55.71	25.26	0	39	44.8	+542.9	2	34.1	2.430 131	+13781	3.62	17 40.8
12	1	03	54.78	56.57	25.26	0	30	39.0	545.8	2	33.9	2.443 896	13765	3.60	17 37.8
13	1	04	52.20	57.42	25.26	0	21	30.2	548.8	2	33.6	2.457 644	13748	3.58	17 34.8
14	1	05	50.46	58.26	25.26	0	12	18.7	551.5	2	33.4	2.471 372	13728	3.56	17 31.9
				59.08					554.2				13707		
15	1	06	49.54		-25.27	-0	03	04.5		-2	33.1	2.485 079		3.54	17 28.9
16	1	07	49.44	+59.90	25.27	+0	06	12.3	+556.8	2	32.9	2.498 761	+13682	3.52	17 26.0
17	1	08	50.13	60.69	25.27	0	15	31.5	559.2	2	32.6	2.512 416	13655	3.50	17 23.1
18*	1	09	51.62	61.49	25.28	0	24	53.2	561.7	2	32.4	2.526 043	13627	3.48	17 20.2
19	1	10	53.88	62.26	25.28	0	34	17.0	563.8	2	32.1	2.539 638	13595	3.47	17 17.3
				63.03					566.1				13562		
20	1	11	56.91		-25.29	+0	43	43.1		-2	31.8	2.553 200		3.45	17 14.4
21	1	13	00.68	+63.77	25.29	0	53	11.3	+568.2	2	31.5	2.566 727	+13527	3.43	17 11.5
22	1	14	05.20	64.52	25.29	1	02	41.4	570.1	2	31.2	2.580 216	13489	3.41	17 08.7
23	1	15	10.45	65.25	25.30	1	12	13.4	572.0	2	30.9	2.593 665	13449	3.39	17 05.9
24	1	16	16.40	65.95	25.31	1	21	47.2	573.8	2	30.6	2.607 072	13407	3.38	17 03.0
				66.66					575.5				13364		
25	1	17	23.06		-25.31	+1	31	22.7		-2	30.3	2.620 436		3.36	17 00.2
26	1	18	30.41	+67.35	25.32	1	40	59.8	+577.1	2	30.0	2.633 754	+13318	3.34	16 57.4
27	1	19	38.44	68.03	25.33	1	50	38.3	578.5	2	29.7	2.647 024	13270	3.32	16 54.6
28	1	20	47.13	68.69	25.33	2	00	18.2	579.9	2	29.3	2.660 246	13222	3.31	16 51.8
29	1	21	56.48	69.35	25.34	2	09	59.5	581.3	2	29.0	2.673 416	13170	3.29	16 49.0
				69.99					582.4				13119		
30	1	23	06.47		-25.35	+2	19	41.9		-2	28.7	2.686 535		3.28	16 46.3
31	1	24	17.08	+70.61	25.36	2	29	25.5	+583.6	2	28.3	2.699 599	+13064	3.26	16 43.5
Feb. 1	1	25	28.32	71.24	25.36	2	39	10.1	584.6	2	28.0	2.712 608	13009	3.24	16 40.8
2*	1	26	40.17	71.85	25.37	2	48	55.7	585.6	2	27.6	2.725 561	12953	3.23	16 38.1
3	1	27	52.61	72.44	25.38	2	58	42.1	586.4	2	27.3	2.738 456	12895	3.21	16 35.3
				73.04					587.2				12837		
4	1	29	05.65		-25.39	+3	08	29.3		-2	26.9	2.751 293		3.20	16 32.6
5	1	30	19.26	+73.61	25.40	3	18	17.3	+588.0	2	26.5	2.764 069	+12776	3.18	16 29.9
6	1	31	33.45	74.19	25.41	3	28	05.9	588.6	2	26.1	2.776 785	12716	3.17	16 27.2
7	1	32	48.20	74.75	25.42	3	37	55.1	589.2	2	25.7	2.789 438	12653	3.15	16 24.5
8	1	34	03.51	75.31	25.43	3	47	44.8	589.7	2	25.3	2.802 028	12590	3.14	16 21.9
				75.87					590.1				12526		
9	1	35	19.38		-25.44	+3	57	34.9		-2	24.9	2.814 554		3.13	16 19.2
10	1	36	35.79	+76.41	25.46	4	07	25.5	+590.6	2	24.5	2.827 014	+12460	3.11	16 16.5
11	1	37	52.74	76.95	25.47	4	17	16.3	590.8	2	24.1	2.839 407	12393	3.10	16 13.9
12	1	39	10.22	77.48	25.48	4	27	07.4	591.1	2	23.7	2.851 731	12324	3.09	16 11.2
13	1	40	28.23	78.01	25.49	4	36	58.7	591.3	2	23.2	2.863 984	12253	3.07	16 08.6
				78.54					591.3				12182		
14	1	41	46.77		-25.50	+4	46	50.0		-2	22.8	2.876 166		3.06	16 06.0
15*	1	43	05.82	+79.05	-25.52	+4	56	41.5	+591.5	-2	22.3	2.888 274	+12108	3.05	16 03.4

Approximate magnitude 8.1

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

FOR 0 ^h UNIVERSAL TIME																	Transit, Meridian of Green- wich
Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth				Hor. Paral- lax		
	h	m	s	^s	^s	°	'	"	["]	'	"				"	h	m
Feb. 15*	1	43	05.82		-25.52	+	4	56	41.5	-2	22.3	2.888	274		3.05	16	03.4
16	1	44	25.37	+ 79.55	25.53		5	06	32.8	2	21.9	2.900	307	+12033	3.03	16	00.8
17	1	45	45.43	80.06	25.55		5	16	24.1	2	21.4	2.912	263	11956	3.02	15	58.2
18	1	47	05.98	80.55	25.56		5	26	15.1	2	20.9	2.924	141	11878	3.01	15	55.6
19	1	48	27.01	81.03	25.57		5	36	05.9	2	20.4	2.935	940	11799	3.00	15	53.0
				81.52					590.5					11717			
20	1	49	48.53		-25.59	+	5	45	56.4	-2	20.0	2.947	657		2.99	15	50.4
21	1	51	10.52	+ 81.99	25.60		5	55	46.4	2	19.5	2.959	292	+11635	2.97	15	47.9
22	1	52	32.97	82.45	25.62		6	05	36.0	2	19.0	2.970	844	11552	2.96	15	45.3
23	1	53	55.88	82.91	25.64		6	15	25.0	2	18.5	2.982	310	11466	2.95	15	42.7
24	1	55	19.24	83.36	25.65		6	25	13.4	2	17.9	2.993	691	11381	2.94	15	40.2
				83.80					587.7					11293			
25	1	56	43.04	+ 84.24	-25.67	+	6	35	01.1	-2	17.4	3.004	984	+11205	2.93	15	37.7
26	1	58	07.28	84.67	25.69		6	44	48.0	2	16.9	3.016	189	11116	2.92	15	35.1
27	1	59	31.95	85.09	25.70		6	54	34.1	2	16.3	3.027	305	11026	2.91	15	32.6
28	2	00	57.04	85.50	25.72		7	04	19.3	2	15.8	3.038	331	10934	2.90	15	30.1
Mar. 1	2	02	22.54	85.92	25.74		7	14	03.5	2	15.2	3.049	265	10844	2.89	15	27.6
									583.2								
2*	2	03	48.46	+ 86.31	-25.76	+	7	23	46.7	-2	14.7	3.060	109	+10751	2.88	15	25.1
3	2	05	14.77	86.72	25.78		7	33	28.8	2	14.1	3.070	860	10658	2.87	15	22.6
4	2	06	41.49	87.11	25.80		7	43	09.7	2	13.5	3.081	518	10564	2.86	15	20.1
5	2	08	08.60	87.49	25.82		7	52	49.4	2	12.9	3.092	082	10471	2.85	15	17.6
6	2	09	36.09	87.88	25.84		8	02	27.9	2	12.4	3.102	553	10377	2.84	15	15.1
									577.1								
7	2	11	03.97	+ 88.27	-25.86	+	8	12	05.0	-2	11.8	3.112	930	+10282	2.83	15	12.7
8	2	12	32.24	88.64	25.88		8	21	40.8	2	11.1	3.123	212	10186	2.82	15	10.2
9	2	14	00.88	89.02	25.90		8	31	15.1	2	10.5	3.133	398	10090	2.81	15	07.8
10	2	15	29.90	89.39	25.92		8	40	48.0	2	09.9	3.143	488	9992	2.80	15	05.3
11	2	16	59.29	89.77	25.95		8	50	19.3	2	09.3	3.153	480	9894	2.79	15	02.9
									569.7								
12	2	18	29.06	+ 90.13	-25.97	+	8	59	49.0	-2	08.6	3.163	374	+ 9795	2.78	15	00.4
13	2	19	59.19	90.49	25.99		9	09	17.1	2	08.0	3.173	169	9693	2.77	14	58.0
14	2	21	29.68	90.86	26.01		9	18	43.5	2	07.3	3.182	862	9593	2.76	14	55.6
15*	2	23	00.54	+ 91.21	26.04		9	28	08.2	2	06.7	3.192	455	+ 9490	2.76	14	53.1
16	2	24	31.75		-26.06	+	9	37	31.1	-2	06.0	3.201	945		2.75	14	50.7

Approximate magnitude 8.4

Aug. 10	6	41	15.61	+104.48	-30.31	+	21	22	21.6	- 45.3	+0.38.0	3.297	617	- 8216	2.67	9 28.5
11	6	43	00.09	104.26	30.31		21	21	36.3	49.2	0 39.2	3.289	401	8323	2.68	9 26.3
12	6	44	44.35	104.01	30.32		21	20	47.1	53.1	0 40.5	3.281	078	8431	2.68	9 24.1
13	6	46	28.36	103.76	30.32		21	19	54.0	56.8	0 41.7	3.272	647	8539	2.69	9 21.9
14	6	48	12.12	103.50	30.33		21	18	57.2	60.6	0 43.0	3.264	108	8644	2.70	9 19.7
15	6	49	55.62	+103.23	-30.33	+	21	17	56.6	- 64.3	+0.44.2	3.255	464	- 8751	2.70	9 17.5
16	6	51	38.85		-30.34	+	21	16	52.3		+0.45.5	3.246	713		2.71	9 15.3

Approximate magnitude 8.6

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension			Red. to Astron. Place	Apparent Declination			Red. to Astron. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich
	h	m	s	s	°	'	"	'		"	h m
Aug. 16	6	51	38.85		-30.34	+21	16 52.3	+0 45.5	3 246 713		2.71 9 15.3
17	6	53	21.81	+102.96	30.34	21	15 44.4	0 46.7	3 237 858	- 8855	2.72 9 13.0
18*	6	55	04.49	102.68	30.35	21	14 32.9	0 47.9	3 228 898	8960	2.73 9 10.8
19	6	56	46.89	102.40	30.35	21	13 17.8	0 49.2	3 219 836	9062	2.73 9 08.6
20	6	58	28.99	102.10	30.35	21	11 59.3	0 50.4	3 210 672	9164	2.74 9 06.3
				101.80						9264	
21	7	00	10.79		-30.36	+21	10 37.4	+0 51.6	3 201 408		2.75 9 04.1
22	7	01	52.28	+101.49	30.36	21	09 12.0	0 52.8	3 192 043	- 9365	2.76 9 01.8
23	7	03	33.47	101.19	30.36	21	07 43.4	0 54.0	3 182 580	9463	2.77 8 59.6
24	7	05	14.34	100.87	30.36	21	06 11.5	0 55.2	3 173 019	9561	2.77 8 57.3
25	7	06	54.89	100.55	30.37	21	04 36.4	0 56.4	3 163 361	9658	2.78 8 55.1
				100.23						9755	
26	7	08	35.12		-30.37	+21	02 58.1	+0 57.6	3 153 606		2.79 8 52.8
27	7	10	15.02	+ 99.90	30.37	21	01 16.8	0 58.8	3 143 756	- 9850	2.80 8 50.5
28	7	11	54.59	99.57	30.37	20	59 32.4	1 00.0	3 133 811	9945	2.81 8 48.2
29	7	13	33.81	99.22	30.37	20	57 45.1	1 01.2	3 123 771	10040	2.82 8 45.9
30	7	15	12.69	98.88	30.37	20	55 54.8	1 02.3	3 113 638	10133	2.83 8 43.7
				98.54						10227	
31	7	16	51.23		-30.37	+20	54 01.7	+1 03.5	3 103 411		2.84 8 41.4
Sept. 1	7	18	29.40	+ 98.17	30.37	20	52 05.8	1 04.7	3 093 091	-10320	2.85 8 39.0
2*	7	20	07.21	97.81	30.37	20	50 07.3	1 05.8	3 082 678	10413	2.85 8 36.7
3	7	21	44.65	97.44	30.36	20	48 06.1	1 07.0	3 072 174	10504	2.86 8 34.4
4	7	23	21.72	97.07	30.36	20	46 02.3	1 08.1	3 061 579	10595	2.87 8 32.1
				96.67						10686	
5	7	24	58.39		-30.36	+20	43 56.0	+1 09.3	3 050 893		2.88 8 29.8
6	7	26	34.68	+ 96.29	30.36	20	41 47.4	1 10.4	3 040 117	-10776	2.89 8 27.4
7	7	28	10.57	95.89	30.35	20	39 36.4	1 11.5	3 029 251	10866	2.90 8 25.1
8	7	29	46.05	95.48	30.35	20	37 23.1	1 12.6	3 018 297	10954	2.92 8 22.7
9	7	31	21.11	95.06	30.35	20	35 07.7	1 13.8	3 007 255	11042	2.93 8 20.4
				94.64						11130	
10	7	32	55.75		-30.35	+20	32 50.2	+1 14.9	2 996 125		2.94 8 18.0
11	7	34	29.96	+ 94.21	30.35	20	30 30.7	1 16.0	2 984 910	-11215	2.95 8 15.6
12	7	36	03.72	93.76	30.34	20	28 09.2	1 17.1	2 973 608	11302	2.96 8 13.3
13	7	37	37.02	93.30	30.34	20	25 45.9	1 18.2	2 962 223	11385	2.97 8 10.9
14	7	39	09.86	92.84	30.34	20	23 20.9	1 19.3	2 950 755	11468	2.98 8 08.5
				92.37						11549	
15*	7	40	42.23		-30.34	+20	20 54.2	+1 20.3	2 939 206		2.99 8 06.1
16	7	42	14.12	+ 91.89	30.33	20	18 25.9	1 21.4	2 927 576	-11630	3.01 8 03.7
17	7	43	45.52	91.40	30.33	20	15 56.2	1 22.5	2 915 868	11708	3.02 8 01.3
18	7	45	16.42	90.90	30.33	20	13 25.0	1 23.5	2 904 082	11786	3.03 7 58.8
19	7	46	46.82	90.40	30.32	20	10 52.6	1 24.6	2 892 221	11861	3.04 7 56.4
				89.88						11935	
20	7	48	16.70		-30.32	+20	08 18.9	+1 25.6	2 880 286		3.06 7 54.0
21	7	49	46.07	+ 89.37	30.32	20	05 44.1	1 26.7	2 868 278	-12008	3.07 7 51.5
22	7	51	14.91	88.84	30.31	20	03 08.2	1 27.7	2 856 199	12079	3.08 7 49.0
23	7	52	43.22	88.31	30.31	20	00 31.4	1 28.7	2 844 049	12150	3.09 7 46.6
24	7	54	10.99	87.77	30.31	19	57 53.7	1 29.7	2 831 829	12220	3.11 7 44.1
				87.22						12287	
25	7	55	38.21		-30.31	+19	55 15.3	+1 30.7	2 819 542		3.12 7 41.6
26	7	57	04.87	+ 86.66	30.30	19	52 36.1	1 31.7	2 807 187	-12355	3.13 7 39.1
27	7	58	30.97	86.10	30.30	19	49 56.5	1 32.7	2 794 766	12421	3.15 7 36.6
28	7	59	56.51	85.54	30.30	19	47 16.3	1 33.7	2 782 281	12485	3.16 7 34.1
29	8	01	21.46	84.95	30.30	19	44 35.8	1 34.7	2 769 731	12550	3.18 7 31.6
				84.36						12613	
30*	8	02	45.82		-30.29	+19	41 55.0	+1 35.7	2 757 118		3.19 7 29.0
Oct. 1	8	04	09.58	+ 83.76	-30.29	+19	39 14.1	+1 36.6	2 744 443	-12675	3.21 7 26.5

Approximate magnitude 8.5

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date		Apparent Right Ascension	Red. to Astrom. Place	Apparent Declination	Red. to Astrom. Place	True Distance from Earth	Hor. Paral- lax	Transit, Meridian of Green- wich
		h m s	s	° ' " "	' "		"	h m
Oct.	1	8 04 09.58 ^s	-30.29	+19 39 14.1	+1 36.6	2.744 443	3.21	7 26.5
	2	8 05 32.73 ^{+83.15}	30.29	19 36 33.1	1 37.6	2.731 708	3.22	7 23.9
	3	8 06 55.27 ^{82.54}	30.29	19 33 52.2	1 38.5	2.718 913	3.24	7 21.4
	4	8 08 17.17 ^{81.90}	30.29	19 31 11.5	1 39.5	2.706 059	3.25	7 18.8
	5	8 09 38.43 ^{81.26}	30.28	19 28 31.2	1 40.4	2.693 148	3.27	7 16.2
	6	8 10 59.03 ^{80.60}	-30.28	+19 25 51.2	+1 41.3	2.680 181	3.28	7 13.6
	7	8 12 18.98 ^{+79.95}	30.28	19 23 11.8	1 42.2	2.667 160	3.30	7 11.0
	8	8 13 38.24 ^{79.26}	30.28	19 20 33.0	1 43.2	2.654 085	3.32	7 08.4
	9	8 14 56.81 ^{78.57}	30.28	19 17 55.1	1 44.1	2.640 958	3.33	7 05.7
	10	8 16 14.68 ^{77.87}	30.28	19 15 18.1	1 44.9	2.627 781	3.35	7 03.1
	11	8 17 31.82 ^{77.14}	-30.28	+19 12 42.1	+1 45.8	2.614 556	3.37	7 00.4
	12	8 18 48.24 ^{+76.42}	30.28	19 10 07.4	1 46.7	2.601 284	3.38	6 57.8
	13	8 20 03.91 ^{75.67}	30.28	19 07 33.9	1 47.6	2.587 968	3.40	6 55.1
	14*	8 21 18.82 ^{74.91}	30.28	19 05 01.9	1 48.4	2.574 610	3.42	6 52.4
	15	8 22 32.96 ^{74.14}	30.28	19 02 31.5	1 49.3	2.561 211	3.44	6 49.7
	16	8 23 46.31 ^{73.35}	-30.29	+19 00 02.7	+1 50.1	2.547 774	3.45	6 47.0
	17	8 24 58.87 ^{+72.56}	30.29	18 57 35.8	1 50.9	2.534 302	3.47	6 44.3
	18	8 26 10.62 ^{71.75}	30.29	18 55 10.9	1 51.8	2.520 796	3.49	6 41.5
	19	8 27 21.55 ^{70.93}	30.29	18 52 48.1	1 52.6	2.507 258	3.51	6 38.7
	20	8 28 31.64 ^{70.09}	30.30	18 50 27.4	1 53.4	2.493 691	3.53	6 36.0
	21	8 29 40.90 ^{69.26}	-30.30	+18 48 09.1	+1 54.2	2.480 097	3.55	6 33.2
	22	8 30 49.30 ^{+68.40}	30.30	18 45 53.3	1 55.0	2.466 477	3.57	6 30.4
	23	8 31 56.84 ^{67.54}	30.31	18 43 40.1	1 55.7	2.452 833	3.59	6 27.6
	24	8 33 03.50 ^{66.66}	30.31	18 41 29.6	1 56.5	2.439 167	3.61	6 24.7
	25	8 34 09.26 ^{65.76}	30.32	18 39 22.1	1 57.3	2.425 481	3.63	6 21.9
	26	8 35 14.11 ^{64.85}	-30.32	+18 37 17.6	+1 58.0	2.411 777	3.65	6 19.0
	27	8 36 18.05 ^{+63.94}	30.33	18 35 16.3	1 58.8	2.398 057	3.67	6 16.2
	28*	8 37 21.05 ^{63.00}	30.34	18 33 18.3	1 59.5	2.384 323	3.69	6 13.3
	29	8 38 23.10 ^{62.05}	30.35	18 31 23.8	2 00.2	2.370 576	3.71	6 10.4
	30	8 39 24.18 ^{61.08}	30.36	18 29 32.9	2 00.9	2.356 819	3.73	6 07.4
Nov.	31	8 40 24.28 ^{60.10}	-30.36	+18 27 45.8	+2 01.6	2.343 053	3.76	6 04.5
	1	8 41 23.37 ^{+59.09}	30.37	18 26 02.7	2 02.3	2.329 281	3.78	6 01.5
	2	8 42 21.45 ^{58.08}	30.38	18 24 23.7	2 03.0	2.315 506	3.80	5 58.6
	3	8 43 18.50 ^{57.05}	30.39	18 22 49.0	2 03.7	2.301 728	3.82	5 55.6
	4	8 44 14.49 ^{55.99}	30.40	18 21 18.7	2 04.3	2.287 951	3.85	5 52.6
	5	8 45 09.40 ^{54.91}	-30.41	+18 19 52.9	+2 05.0	2.274 177	3.87	5 49.5
	6	8 46 03.22 ^{+53.82}	30.43	18 18 32.0	2 05.6	2.260 408	3.89	5 46.5
	7	8 46 55.93 ^{52.71}	30.44	18 17 16.0	2 06.2	2.246 648	3.92	5 43.4
	8	8 47 47.50 ^{51.57}	30.45	18 16 05.1	2 06.9	2.232 898	3.94	5 40.4
	9	8 48 37.92 ^{50.42}	30.47	18 14 59.5	2 07.5	2.219 163	3.97	5 37.3
	10	8 49 27.16 ^{49.24}	-30.48	+18 13 59.3	+2 08.1	2.205 445	3.99	5 34.1
	11*	8 50 15.20 ^{+48.04}	30.50	18 13 04.6	2 08.7	2.191 747	4.02	5 31.0
	12	8 51 02.03 ^{46.83}	30.51	18 12 15.8	2 09.2	2.178 072	4.04	5 27.8
	13	8 51 47.63 ^{45.60}	30.53	18 11 32.8	2 09.8	2.164 425	4.07	5 24.7
	14	8 52 31.97 ^{44.34}	30.55	18 10 55.9	2 10.4	2.150 809	4.09	5 21.5
	15	8 53 15.04 ^{43.07}	-30.56	+18 10 25.2	+2 10.9	2.137 226	4.12	5 18.2
	16	8 53 56.83 ^{+41.79}	-30.58	+18 10 00.9	+2 11.4	2.123 680	4.14	5 15.0

Approximate magnitude 8.0
* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

FOR 0^h UNIVERSAL TIME

Date	Apparent Right Ascension				Red. to Astrom. Place	Apparent Declination				Red. to Astrom. Place	True Distance from Earth	Hor. Parallax	Transit, Meridian of Greenwich	
	h	m	s	s	s	°	'	"	"	'	"	"	h	m
Nov. 16	8	53	56.83		-30.58	+18	10	00.9	-17.8	+2	11.4	2.123 680	4.14	5 15.0
17	8	54	37.31	+40.48	30.60	18	09	43.1	11.2	2	11.9	2.110 175	4.17	5 11.7
18	8	55	16.47	39.16	30.62	18	09	31.9	-4.4	2	12.4	2.096 713	4.20	5 08.4
19	8	55	54.28	37.81	30.64	18	09	27.5	+2.6	2	12.9	2.083 298	4.22	5 05.1
20	8	56	30.74	35.09	30.67	18	09	30.1	9.7	2	13.4	2.069 933	4.25	5 01.8
												13312		
21	8	57	05.83		-30.69	+18	09	39.8	+16.9	+2	13.9	2.056 621	4.28	4 58.4
22	8	57	39.51	+33.68	30.71	18	09	56.7	24.3	2	14.3	2.043 365	4.31	4 55.1
23	8	58	11.78	32.27	30.74	18	10	21.0	31.8	2	14.8	2.030 169	4.33	4 51.7
24*	8	58	42.61	30.83	30.76	18	10	52.8	39.5	2	15.2	2.017 035	4.36	4 48.2
25	8	59	12.00	29.39	30.79	18	11	32.3	47.3	2	15.6	2.003 967	4.39	4 44.8
				27.90								12998		
26	8	59	39.90		-30.81	+18	12	19.6	+55.3	+2	16.0	1.990 969	4.42	4 41.3
27	9	00	06.31	+26.41	30.84	18	13	14.9	63.4	2	16.4	1.978 043	4.45	4 37.8
28	9	00	31.21	24.90	30.87	18	14	18.3	71.6	2	16.8	1.965 193	4.48	4 34.3
29	9	00	54.56	23.35	30.89	18	15	29.9	80.0	2	17.2	1.952 423	4.51	4 30.7
30	9	01	16.36	21.80	30.92	18	16	49.9	88.5	2	17.5	1.939 736	4.54	4 27.2
				20.22								12600		
Dec. 1	9	01	36.58		-30.95	+18	18	18.4	+97.0	+2	17.8	1.927 136	4.57	4 23.6
2	9	01	55.19	+18.61	30.98	18	19	55.4	105.9	2	18.2	1.914 627	4.60	4 19.9
3	9	02	12.18	16.99	31.02	18	21	41.3	114.7	2	18.5	1.902 212	4.63	4 16.3
4	9	02	27.53	15.35	31.05	18	23	36.0	123.6	2	18.8	1.889 896	4.66	4 12.6
5	9	02	41.21	13.68	31.08	18	25	39.6	132.7	2	19.0	1.877 684	4.69	4 08.9
				11.99								12106		
6	9	02	53.20		-31.11	+18	27	52.3	+141.8	+2	19.3	1.865 578	4.72	4 05.2
7	9	03	03.48	+10.28	31.15	18	30	14.1	151.0	2	19.5	1.853 584	4.75	4 01.4
8*	9	03	12.04	8.56	31.19	18	32	45.1	160.3	2	19.8	1.841 707	4.78	3 57.6
9	9	03	18.85	6.81	31.22	18	35	25.4	169.7	2	20.0	1.829 951	4.81	3 53.8
10	9	03	23.90	5.05	31.26	18	38	15.1	179.0	2	20.2	1.818 321	4.84	3 49.9
				3.27								11500		
11	9	03	27.17		-31.30	+18	41	14.1	+188.3	+2	20.3	1.806 821	4.87	3 46.0
12	9	03	28.66	+1.49	31.34	18	44	22.4	197.8	2	20.5	1.795 458	4.90	3 42.1
13	9	03	28.34	-0.32	31.38	18	47	40.2	207.1	2	20.7	1.784 234	4.93	3 38.2
14	9	03	26.22	2.12	31.42	18	51	07.3	216.6	2	20.8	1.773 156	4.96	3 34.2
15	9	03	22.28	3.94	31.46	18	54	43.9	225.8	2	20.9	1.762 228	4.99	3 30.2
				5.75								10775		
16	9	03	16.53		-31.50	+18	58	29.7	+235.2	+2	21.0	1.751 453	5.02	3 26.2
17	9	03	08.94	-7.59	31.55	19	02	24.9	244.5	2	21.0	1.740 837	5.06	3 22.1
18	9	02	59.52	9.42	31.59	19	06	29.4	253.6	2	21.0	1.730 385	5.09	3 18.0
19	9	02	48.26	11.26	31.63	19	10	43.0	262.7	2	21.1	1.720 099	5.12	3 13.9
20	9	02	35.16	13.10	31.68	19	15	05.7	271.9	2	21.2	1.709 986	5.15	3 09.7
				14.94								9937		
21	9	02	20.22		-31.72	+19	19	37.6	+280.7	+2	21.1	1.700 049	5.18	3 05.6
22*	9	02	03.44	-16.78	31.77	19	24	18.3	289.6	2	21.1	1.690 292	5.21	3 01.4
23	9	01	44.81	18.63	31.82	19	29	07.9	298.3	2	21.1	1.680 719	5.24	2 57.1
24	9	01	24.35	20.46	31.86	19	34	06.2	306.8	2	21.0	1.671 336	5.27	2 52.8
25	9	01	02.06	22.29	31.92	19	39	13.0	315.3	2	20.9	1.662 146	5.29	2 48.5
				24.12								8992		
26	9	00	37.94		-31.96	+19	44	28.3	+323.4	+2	20.8	1.653 154	5.32	2 44.2
27	9	00	11.99	-25.95	32.01	19	49	51.7	331.5	2	20.7	1.644 364	5.35	2 39.8
28	8	59	44.24	27.75	32.06	19	55	23.2	339.4	2	20.6	1.635 780	5.38	2 35.4
29	8	59	14.68	29.56	32.11	20	01	02.6	347.0	2	20.4	1.627 406	5.41	2 31.0
30	8	58	43.33	31.35	32.17	20	06	49.6	354.3	2	20.2	1.619 248	5.43	2 26.6
				33.12								7940		
31	8	58	10.21		-32.22	+20	12	43.9	+361.4	+2	20.0	1.611 308	5.46	2 22.1
32	8	57	35.33	-34.88	-32.27	+20	18	45.3		+2	19.8	1.603 592	5.49	2 17.6

Approximate magnitude 7.4

* On the dates so indicated the lunar inequality is a maximum in Right Ascension.

PART II

STARS

The constants of precession, nutation, and aberration given on page xvi, are used in the following formulas.

BESSELIAN STAR NUMBERS

<i>Terms of Long Period</i>	<i>Terms of Short Period</i>
$A = \tau - 0.342 \ 33 \sin \Omega$	$-0.004 \ 05 \sin 2 \ \mathcal{C}$
$+ 0.004 \ 15 \sin 2 \ \mathcal{Q}$	$+0.000 \ 23 \sin (\mathcal{C} + \Gamma')$
$- 0.025 \ 26 \sin 2 \ L$	$+0.001 \ 35 \sin (\mathcal{C} - \Gamma')$
$+ 0.002 \ 51 \sin (L - \Gamma)$	$-0.000 \ 68 \sin (2 \ \mathcal{C} - \mathcal{Q})$
$- 0.000 \ 99 \sin (3 \ L - \Gamma)$	$-0.000 \ 52 \sin (3 \ \mathcal{C} - \Gamma')$
$+ 0.000 \ 42 \sin (L + \Gamma)$	$+0.000 \ 30 \sin (\mathcal{C} - 2 \ L + \Gamma')$
$+ 0.000 \ 25 \sin (2 \ L - \mathcal{Q})$	$+0.000 \ 12 \sin 2 \ (\mathcal{C} - L)$
$+ 0.000 \ 10 \sin (2 \ \Gamma' - \mathcal{Q})$	$+0.000 \ 12 \sin (\mathcal{C} - \Gamma' + \mathcal{Q})$
$+ 0.000 \ 09 \sin 2 \ (L - \Gamma')$	$+0.000 \ 12 \sin (\mathcal{C} - \Gamma' - \mathcal{Q})$
	$-0.000 \ 10 \sin (3 \ \mathcal{C} - 2L + \Gamma')$
	$-0.000 \ 08 \sin (3 \ \mathcal{C} - \Gamma' - \mathcal{Q})$
	$+0.000 \ 06 \sin 2 \ (\mathcal{C} - \Gamma')$
"	"
$B = -9.210 \cos \mathcal{Q}$	$-0.088 \cos 2 \ \mathcal{C}$
$+ 0.090 \cos 2 \ \mathcal{Q}$	$-0.018 \cos (2 \ \mathcal{C} - \mathcal{Q})$
$- 0.551 \cos 2 \ L$	$-0.011 \cos (3 \ \mathcal{C} - \Gamma')$
$- 0.022 \cos (3 \ L - \Gamma)$	$+0.005 \cos (\mathcal{C} + \Gamma')$
$+ 0.009 \cos (L + \Gamma)$	$+0.003 \cos (\mathcal{C} - \Gamma' + \mathcal{Q})$
$+ 0.007 \cos (2 \ L - \mathcal{Q})$	$-0.003 \cos (\mathcal{C} - \Gamma' - \mathcal{Q})$
$+ 0.003 \cos (2\Gamma' - \mathcal{Q})$	$-0.002 \cos (3 \ \mathcal{C} - 2L + \Gamma')$
	$-0.002 \cos (3 \ \mathcal{C} - \Gamma' - \mathcal{Q})$
$C = -20''.4700 \cos \epsilon \cos \odot$	
$D = -20''.4700 \sin \odot$	
$E = +0.000151 \ \delta\psi$ (in time)	

BESSEL'S STAR CONSTANTS

$a = 3^s.073 \ 42 + 1^s.336 \ 13 \sin \alpha_0 \tan \delta_0$	$a' = 20''.0419 \cos \alpha_0$
$b = \frac{1}{15} \cos \alpha_0 \tan \delta_0$	$b' = -\sin \alpha_0$
$c = \frac{1}{15} \cos \alpha_0 \sec \delta_0$	$c' = \tan \epsilon \cos \delta_0 - \sin \alpha_0 \sin \delta_0$
$d = \frac{1}{15} \sin \alpha_0 \sec \delta_0$	$d' = \cos \alpha_0 \sin \delta_0$

Formulas for Reduction to Apparent Position

$$\alpha = \alpha_0 + \tau\mu + Aa + Bb + Cc + Dd + E \quad (\text{in time})$$

$$\delta = \delta_0 + \tau\mu' + Aa' + Bb' + Cc' + Dd' \quad (\text{in arc})$$

INDEPENDENT STAR NUMBERS

$$f + f' = +46''.1012 \ A + 15E = +46''.1012 \ \tau + 0.917444 \ \delta\psi \quad (\text{in arc})$$

$$= +3^s.07342 \ A + E = +3^s.07342 \ \tau + 0.0611629 \ \delta\psi \quad (\text{in time})$$

$$f' = 3^s.073 \ A_2 = 0.06116 \ d\psi \quad (\text{in time})$$

$$g \sin G = B \qquad h \sin H = C \qquad i = C \tan \epsilon$$

$$g \cos G = 20''.0419 \ A \qquad h \cos H = D$$

Formulas for Reduction to Apparent Position

$$\alpha = \alpha_0 + f + f' + \tau\mu + \frac{1}{15} g \sin (G + \alpha_0) \tan \delta_0 + \frac{1}{15} h \sin (H + \alpha_0) \sec \delta_0 \quad (\text{in time})$$

$$\delta = \delta_0 + \tau\mu' + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta_0 + i \cos \delta_0 \quad (\text{in arc})$$

NOTATION

τ denotes the time reckoned in units of one year, from the beginning of the Besselian solar year (1958, January 0^d.861, Universal Time),
 α_0, δ_0 , the star's mean R. A. and Decl. at the beginning of the solar year,
 α, δ , the star's apparent right ascension and declination at the time τ ,
 μ, μ' , the annual proper motion in right ascension and declination,

- $\odot$, the Sun's true longitude referred to the mean equinox of date,
- ϵ , the mean obliquity of the ecliptic,
- Ω , the longitude of the Moon's ascending node,
- $L, \mathcal{C}$, the mean longitude of the Sun and Moon,
- Γ, Γ' , the mean longitudes of the perigees of the Sun and Moon,
- $\delta\psi, \delta\epsilon$, the nutation in longitude and obliquity as defined on page viii,
- $d\psi, d\epsilon$, terms of short period in $\delta\psi$ and $\delta\epsilon$,
- A_2 , terms of short period in A .

In the computation of the Besselian star numbers given for Greenwich mean midnight of each day of the year, on pages 248-259, the short-period terms—that is, the terms involving the Moon's mean longitude—have been included.

In the computation of the independent star numbers, pages 260-267, the short-period terms have been included in the two columns headed G and $\text{Log } g$. The quantities f and f' give separately the effect of the long-period and short-period terms.

The values of $d\psi$ and $d\epsilon$ for Greenwich mean midnight of each day of the year are given on pages 252-259.

FOR 0^h UNIVERSAL TIME

Date		Log A	Log B	Log C	Log D	Date	Log A	Log B	Log C	Log D	
Jan.	0	9.3300	0.8946	0.4706 <i>n</i>	1.3057	Feb. 15	9.5475	0.8713	1.1913 <i>n</i>	1.0608	
	1	9.3358	0.8964	0.5164 <i>n</i>	1.3044		16	9.5512	0.8690	1.1964 <i>n</i>	1.0493
	2	9.3430	0.8980	0.5577 <i>n</i>	1.3029		17	9.5539	0.8665	1.2013 <i>n</i>	1.0374
	3	9.3513	0.8993	0.5955 <i>n</i>	1.3013		18	9.5560	0.8639	1.2060 <i>n</i>	1.0250
	4	9.3606	0.8998	0.6300 <i>n</i>	1.2996	19	9.5573	0.8618	1.2105 <i>n</i>	1.0121	
	5	9.3702	0.8996	0.6619 <i>n</i>	1.2977	20	9.5582	0.8602	1.2149 <i>n</i>	0.9987	
	6	9.3794	0.8982	0.6914 <i>n</i>	1.2957	21	9.5588	0.8591	1.2191 <i>n</i>	0.9847	
	7	9.3875	0.8963	0.7189 <i>n</i>	1.2935	22	9.5593	0.8587	1.2231 <i>n</i>	0.9702	
	8	9.3940	0.8940	0.7447 <i>n</i>	1.2912	23	9.5601	0.8590	1.2269 <i>n</i>	0.9549	
	9	9.3988	0.8917	0.7689 <i>n</i>	1.2888	24	9.5613	0.8600	1.2305 <i>n</i>	0.9390	
	10	9.4024	0.8901	0.7917 <i>n</i>	1.2861	25	9.5630	0.8609	1.2340 <i>n</i>	0.9224	
	11	9.4053	0.8894	0.8132 <i>n</i>	1.2833	26	9.5655	0.8622	1.2374 <i>n</i>	0.9049	
	12	9.4082	0.8897	0.8335 <i>n</i>	1.2804	27	9.5689	0.8631	1.2405 <i>n</i>	0.8865	
	13	9.4118	0.8910	0.8529 <i>n</i>	1.2773	28	9.5728	0.8631	1.2436 <i>n</i>	0.8674	
14	9.4165	0.8925	0.8713 <i>n</i>	1.2741	Mar. 1	9.5768	0.8625	1.2464 <i>n</i>	0.8471		
15	9.4224	0.8940	0.8887 <i>n</i>	1.2707		2	9.5807	0.8608	1.2491 <i>n</i>	0.8258	
16	9.4295	0.8950	0.9054 <i>n</i>	1.2671		3	9.5839	0.8582	1.2517 <i>n</i>	0.8032	
17	9.4369	0.8950	0.9213 <i>n</i>	1.2634		4	9.5862	0.8555	1.2541 <i>n</i>	0.7792	
18	9.4442	0.8941	0.9365 <i>n</i>	1.2595		5	9.5875	0.8532	1.2563 <i>n</i>	0.7537	
19	9.4508	0.8925	0.9511 <i>n</i>	1.2553		6	9.5880	0.8517	1.2584 <i>n</i>	0.7265	
20	9.4565	0.8904	0.9651 <i>n</i>	1.2511		7	9.5883	0.8513	1.2604 <i>n</i>	0.6973	
21	9.4611	0.8880	0.9785 <i>n</i>	1.2467		8	9.5887	0.8525	1.2623 <i>n</i>	0.6659	
22	9.4646	0.8855	0.9914 <i>n</i>	1.2420		9	9.5897	0.8542	1.2639 <i>n</i>	0.6318	
23	9.4675	0.8837	1.0037 <i>n</i>	1.2372		10	9.5916	0.8564	1.2655 <i>n</i>	0.5948	
24	9.4697	0.8820	1.0156 <i>n</i>	1.2322		11	9.5944	0.8584	1.2669 <i>n</i>	0.5544	
25	9.4715	0.8811	1.0270 <i>n</i>	1.2270		12	9.5979	0.8597	1.2682 <i>n</i>	0.5095	
26	9.4734	0.8809	1.0380 <i>n</i>	1.2216		13	9.6016	0.8600	1.2693 <i>n</i>	0.4594	
27	9.4757	0.8813	1.0486 <i>n</i>	1.2160		14	9.6050	0.8594	1.2704 <i>n</i>	0.4024	
28	9.4785	0.8821	1.0588 <i>n</i>	1.2102	15	9.6078	0.8580	1.2712 <i>n</i>	0.3369		
29	9.4822	0.8830	1.0686 <i>n</i>	1.2041	16	9.6099	0.8562	1.2720 <i>n</i>	0.2596		
30	9.4869	0.8838	1.0781 <i>n</i>	1.1979	17	9.6113	0.8544	1.2726 <i>n</i>	0.1655		
31	9.4924	0.8842	1.0872 <i>n</i>	1.1914	18	9.6120	0.8529	1.2730 <i>n</i>	0.0449		
Feb.	1	9.4986	0.8838	1.0960 <i>n</i>	1.1847	19	9.6124	0.8520	1.2734 <i>n</i>	9.8774	
	2	9.5046	0.8821	1.1046 <i>n</i>	1.1777	20	9.6124	0.8518	1.2736 <i>n</i>	9.6010	
	3	9.5100	0.8797	1.1127 <i>n</i>	1.1705	21	9.6126	0.8522	1.2737 <i>n</i>	8.6435	
	4	9.5145	0.8767	1.1207 <i>n</i>	1.1631	22	9.6128	0.8533	1.2736 <i>n</i>	9.4914 <i>n</i>	
	5	9.5177	0.8737	1.1283 <i>n</i>	1.1553	23	9.6134	0.8550	1.2735 <i>n</i>	9.8228 <i>n</i>	
	6	9.5198	0.8713	1.1357 <i>n</i>	1.1473	24	9.6145	0.8570	1.2732 <i>n</i>	0.0082 <i>n</i>	
	7	9.5210	0.8698	1.1428 <i>n</i>	1.1390	25	9.6161	0.8593	1.2727 <i>n</i>	0.1374 <i>n</i>	
	8	9.5222	0.8694	1.1497 <i>n</i>	1.1304	26	9.6185	0.8612	1.2721 <i>n</i>	0.2368 <i>n</i>	
	9	9.5237	0.8701	1.1563 <i>n</i>	1.1215	27	9.6214	0.8625	1.2714 <i>n</i>	0.3174 <i>n</i>	
	10	9.5261	0.8713	1.1627 <i>n</i>	1.1123	28	9.6246	0.8633	1.2706 <i>n</i>	0.3854 <i>n</i>	
	11	9.5294	0.8726	1.1688 <i>n</i>	1.1027	29	9.6278	0.8629	1.2697 <i>n</i>	0.4439 <i>n</i>	
	12	9.5336	0.8736	1.1747 <i>n</i>	1.0928	30	9.6307	0.8617	1.2686 <i>n</i>	0.4954 <i>n</i>	
	13	9.5383	0.8737	1.1805 <i>n</i>	1.0826	31	9.6329	0.8602	1.2673 <i>n</i>	0.5412 <i>n</i>	
	14	9.5431	0.8729	1.1860 <i>n</i>	1.0719	Apr. 1	9.6343	0.8587	1.2660 <i>n</i>	0.5825 <i>n</i>	
15	9.5475	0.8713	1.1913 <i>n</i>	1.0608	2		9.6349	0.8579	1.2645 <i>n</i>	0.6200 <i>n</i>	

E = +0^s.002

FOR 0^h UNIVERSAL TIME

Date	Log A	Log B	Log C	Log D	Date	Log A	Log B	Log C	Log D
Apr. 1	9.6343	0.8587	1.2660 _n	0.5825 _n	May 17	9.7189	0.9128	1.0258 _n	1.2276 _n
2	9.6349	0.8579	1.2645 _n	0.6200 _n	18	9.7209	0.9154	1.0149 _n	1.2325 _n
3	9.6351	0.8582	1.2629 _n	0.6545 _n	19	9.7235	0.9179	1.0036 _n	1.2372 _n
4	9.6354	0.8598	1.2611 _n	0.6863 _n	20	9.7266	0.9201	0.9920 _n	1.2418 _n
5	9.6360	0.8623	1.2592 _n	0.7158 _n	21	9.7299	0.9215	0.9798 _n	1.2462 _n
6	9.6375	0.8655	1.2572 _n	0.7433 _n	22	9.7334	0.9225	0.9673 _n	1.2504 _n
7	9.6400	0.8686	1.2550 _n	0.7690 _n	23	9.7367	0.9225	0.9541 _n	1.2545 _n
8	9.6431	0.8713	1.2527 _n	0.7931 _n	24	9.7396	0.9218	0.9406 _n	1.2584 _n
9	9.6466	0.8730	1.2503 _n	0.8158 _n	25	9.7420	0.9211	0.9264 _n	1.2621 _n
10	9.6500	0.8737	1.2477 _n	0.8373 _n	26	9.7437	0.9204	0.9116 _n	1.2657 _n
11	9.6530	0.8734	1.2450 _n	0.8576 _n	27	9.7450	0.9204	0.8961 _n	1.2691 _n
12	9.6554	0.8726	1.2421 _n	0.8769 _n	28	9.7462	0.9212	0.8801 _n	1.2724 _n
13	9.6571	0.8718	1.2391 _n	0.8952 _n	29	9.7473	0.9229	0.8632 _n	1.2756 _n
14	9.6582	0.8712	1.2359 _n	0.9126 _n	30	9.7490	0.9255	0.8455 _n	1.2786 _n
15	9.6588	0.8710	1.2326 _n	0.9293 _n	31	9.7513	0.9283	0.8270 _n	1.2814 _n
16	9.6591	0.8716	1.2292 _n	0.9452 _n	June 1	9.7543	0.9309	0.8075 _n	1.2841 _n
17	9.6595	0.8727	1.2255 _n	0.9604 _n	2	9.7579	0.9331	0.7870 _n	1.2867 _n
18	9.6600	0.8745	1.2218 _n	0.9750 _n	3	9.7616	0.9342	0.7654 _n	1.2891 _n
19	9.6609	0.8770	1.2179 _n	0.9889 _n	4	9.7652	0.9346	0.7426 _n	1.2914 _n
20	9.6621	0.8797	1.2138 _n	1.0023 _n	5	9.7685	0.9342	0.7183 _n	1.2936 _n
21	9.6639	0.8825	1.2095 _n	1.0152 _n	6	9.7713	0.9332	0.6924 _n	1.2956 _n
22	9.6662	0.8850	1.2050 _n	1.0276 _n	7	9.7735	0.9323	0.6648 _n	1.2975 _n
23	9.6690	0.8873	1.2005 _n	1.0394 _n	8	9.7752	0.9315	0.6352 _n	1.2993 _n
24	9.6722	0.8889	1.1957 _n	1.0509 _n	9	9.7765	0.9311	0.6034 _n	1.3010 _n
25	9.6755	0.8895	1.1908 _n	1.0619 _n	10	9.7777	0.9315	0.5687 _n	1.3025 _n
26	9.6786	0.8895	1.1857 _n	1.0725 _n	11	9.7788	0.9323	0.5311 _n	1.3039 _n
27	9.6811	0.8888	1.1803 _n	1.0828 _n	12	9.7801	0.9337	0.4897 _n	1.3052 _n
28	9.6830	0.8882	1.1748 _n	1.0927 _n	13	9.7817	0.9354	0.4439 _n	1.3063 _n
29	9.6843	0.8877	1.1691 _n	1.1022 _n	14	9.7838	0.9372	0.3925 _n	1.3073 _n
30	9.6850	0.8882	1.1633 _n	1.1114 _n	15	9.7862	0.9391	0.3343 _n	1.3082 _n
May 1	9.6857	0.8897	1.1572 _n	1.1203 _n	16	9.7891	0.9406	0.2667 _n	1.3090 _n
2	9.6867	0.8922	1.1508 _n	1.1289 _n	17	9.7922	0.9417	0.1864 _n	1.3097 _n
3	9.6883	0.8954	1.1443 _n	1.1372 _n	18	9.7956	0.9419	0.0878 _n	1.3102 _n
4	9.6907	0.8989	1.1376 _n	1.1452 _n	19	9.7987	0.9415	9.9595 _n	1.3106 _n
5	9.6939	0.9019	1.1306 _n	1.1529 _n	20	9.8017	0.9404	9.7767 _n	1.3109 _n
6	9.6975	0.9043	1.1234 _n	1.1604 _n	21	9.8041	0.9388	9.4564 _n	1.3111 _n
7	9.7012	0.9058	1.1159 _n	1.1676 _n	22	9.8060	0.9375	8.4314	1.3111 _n
8	9.7048	0.9061	1.1082 _n	1.1746 _n	23	9.8074	0.9365	9.5315	1.3110 _n
9	9.7078	0.9060	1.1002 _n	1.1813 _n	24	9.8086	0.9362	9.8149	1.3108 _n
10	9.7102	0.9053	1.0920 _n	1.1879 _n	25	9.8097	0.9369	9.9845	1.3105 _n
11	9.7120	0.9049	1.0835 _n	1.1941 _n	26	9.8111	0.9384	0.1062	1.3101 _n
12	9.7132	0.9048	1.0747 _n	1.2002 _n	27	9.8130	0.9402	0.2011	1.3095 _n
13	9.7141	0.9054	1.0655 _n	1.2061 _n	28	9.8155	0.9420	0.2788	1.3089 _n
14	9.7151	0.9064	1.0561 _n	1.2118 _n	29	9.8185	0.9435	0.3444	1.3081 _n
15	9.7160	0.9081	1.0463 _n	1.2172 _n	30	9.8217	0.9442	0.4014	1.3072 _n
16	9.7172	0.9103	1.0363 _n	1.2225 _n	July 1	9.8249	0.9441	0.4516	1.3061 _n
17	9.7189	0.9128	1.0258 _n	1.2276 _n	2	9.8280	0.9430	0.4967	1.3050 _n

FOR 0^h UNIVERSAL TIME

Date		Log A	Log B	Log C	Log D	Date	Log A	Log B	Log C	Log D	
July	1	9.8249	0.9441	0.4516	1.3061 _n	Aug.	16	9.9011	0.9127	1.1739	1.0943 _n
	2	9.8280	0.9430	0.4967	1.3050 _n		17	9.9016	0.9109	1.1794	1.0846 _n
	3	9.8306	0.9415	0.5373	1.3037 _n		18	9.9019	0.9100	1.1847	1.0745 _n
	4	9.8327	0.9397	0.5744	1.3023 _n		19	9.9023	0.9101	1.1897	1.0641 _n
	5	9.8344	0.9381	0.6083	1.3007 _n		20	9.9030	0.9111	1.1947	1.0533 _n
	6	9.8357	0.9369	0.6398	1.2991 _n		21	9.9041	0.9125	1.1994	1.0420 _n
	7	9.8367	0.9360	0.6689	1.2973 _n		22	9.9057	0.9136	1.2040	1.0304 _n
	8	9.8377	0.9359	0.6962	1.2953 _n		23	9.9075	0.9142	1.2084	1.0183 _n
	9	9.8387	0.9362	0.7217	1.2933 _n		24	9.9095	0.9139	1.2127	1.0057 _n
	10	9.8399	0.9369	0.7457	1.2911 _n		25	9.9114	0.9128	1.2167	0.9926 _n
	11	9.8415	0.9382	0.7683	1.2888 _n		26	9.9131	0.9108	1.2207	0.9790 _n
	12	9.8434	0.9391	0.7897	1.2864 _n		27	9.9143	0.9088	1.2244	0.9648 _n
	13	9.8457	0.9401	0.8100	1.2838 _n		28	9.9152	0.9064	1.2280	0.9500 _n
	14	9.8483	0.9407	0.8292	1.2811 _n		29	9.9158	0.9045	1.2315	0.9345 _n
	15	9.8511	0.9403	0.8475	1.2782 _n		30	9.9161	0.9030	1.2348	0.9183 _n
	16	9.8538	0.9393	0.8650	1.2752 _n		31	9.9162	0.9021	1.2380	0.9013 _n
	17	9.8564	0.9376	0.8817	1.2721 _n	Sept.	1	9.9164	0.9018	1.2410	0.8836 _n
	18	9.8585	0.9354	0.8976	1.2688 _n		2	9.9167	0.9021	1.2439	0.8649 _n
	19	9.8601	0.9331	0.9129	1.2654 _n		3	9.9171	0.9028	1.2467	0.8453 _n
	20	9.8614	0.9312	0.9275	1.2618 _n		4	9.9178	0.9038	1.2493	0.8245 _n
	21	9.8623	0.9300	0.9416	1.2581 _n		5	9.9187	0.9050	1.2517	0.8026 _n
	22	9.8630	0.9297	0.9551	1.2542 _n		6	9.9200	0.9059	1.2541	0.7795 _n
	23	9.8640	0.9302	0.9680	1.2502 _n		7	9.9214	0.9063	1.2563	0.7548 _n
	24	9.8652	0.9314	0.9805	1.2460 _n		8	9.9231	0.9059	1.2583	0.7285 _n
	25	9.8670	0.9326	0.9925	1.2416 _n		9	9.9247	0.9049	1.2602	0.7004 _n
	26	9.8692	0.9336	1.0041	1.2371 _n		10	9.9261	0.9029	1.2620	0.6702 _n
	27	9.8717	0.9338	1.0152	1.2324 _n		11	9.9272	0.9009	1.2637	0.6375 _n
	28	9.8743	0.9332	1.0260	1.2275 _n		12	9.9279	0.8988	1.2652	0.6021 _n
	29	9.8767	0.9320	1.0363	1.2224 _n		13	9.9282	0.8971	1.2666	0.5634 _n
	30	9.8789	0.9299	1.0464	1.2172 _n		14	9.9283	0.8965	1.2679	0.5206 _n
	31	9.8806	0.9278	1.0561	1.2118 _n		15	9.9284	0.8969	1.2691	0.4730 _n
Aug.	1	9.8819	0.9254	1.0655	1.2062 _n	16	9.9287	0.8983	1.2701	0.4195 _n	
	2	9.8828	0.9236	1.0745	1.2004 _n	17	9.9294	0.9004	1.2710	0.3581 _n	
	3	9.8835	0.9219	1.0833	1.1943 _n	18	9.9305	0.9023	1.2717	0.2865 _n	
	4	9.8841	0.9210	1.0917	1.1881 _n	19	9.9320	0.9040	1.2724	0.2003 _n	
	5	9.8846	0.9207	1.0999	1.1817 _n	20	9.9337	0.9047	1.2729	0.0927 _n	
	6	9.8853	0.9209	1.1078	1.1750 _n	21	9.9353	0.9045	1.2733	9.9489 _n	
	7	9.8862	0.9215	1.1154	1.1681 _n	22	9.9368	0.9036	1.2735	9.7324 _n	
	8	9.8874	0.9223	1.1228	1.1609 _n	23	9.9379	0.9022	1.2736	9.2810 _n	
	9	9.8890	0.9230	1.1300	1.1536 _n	24	9.9387	0.9005	1.2737	9.2014	
	10	9.8908	0.9232	1.1369	1.1460 _n	25	9.9391	0.8993	1.2736	9.7067	
	11	9.8929	0.9230	1.1436	1.1380 _n	26	9.9393	0.8983	1.2733	9.9340	
	12	9.8951	0.9218	1.1501	1.1299 _n	27	9.9393	0.8982	1.2729	0.0824	
	13	9.8971	0.9202	1.1563	1.1214 _n	28	9.9393	0.8987	1.2724	0.1926	
	14	9.8989	0.9177	1.1624	1.1127 _n	29	9.9395	0.8998	1.2718	0.2804	
	15	9.9002	0.9150	1.1683	1.1036 _n	30	9.9397	0.9013	1.2710	0.3535	
	16	9.9011	0.9127	1.1739	1.0943 _n	Oct. 1	9.9402	0.9030	1.2701	0.4160	

FOR 0^h UNIVERSAL TIME

Date	Log A	Log B	Log C	Log D	Date	Log A	Log B	Log C	Log D
Oct. 1	9.9402	0.9030	1.2701	0.4160	Nov. 16	9.9886	0.9495	1.0519	1.2142
2	9.9409	0.9050	1.2691	0.4704	17	9.9900	0.9490	1.0415	1.2198
3	9.9419	0.9067	1.2680	0.5186	18	9.9912	0.9483	1.0307	1.2252
4	9.9432	0.9083	1.2667	0.5619	19	9.9920	0.9482	1.0195	1.2304
5	9.9446	0.9090	1.2653	0.6013	20	9.9926	0.9484	1.0079	1.2355
6	9.9461	0.9092	1.2637	0.6373	21	9.9931	0.9491	0.9958	1.2404
7	9.9475	0.9085	1.2620	0.6704	22	9.9937	0.9507	0.9832	1.2450
8	9.9487	0.9075	1.2602	0.7011	23	9.9945	0.9525	0.9701	1.2495
9	9.9495	0.9063	1.2582	0.7297	24	9.9954	0.9547	0.9565	1.2538
10	9.9499	0.9053	1.2561	0.7563	25	9.9966	0.9568	0.9422	1.2579
11	9.9500	0.9052	1.2539	0.7813	26	9.9980	0.9589	0.9274	1.2619
12	9.9501	0.9061	1.2515	0.8049	27	9.9996	0.9607	0.9118	1.2656
13	9.9504	0.9081	1.2490	0.8270	28	0.0014	0.9623	0.8955	1.2693
14	9.9510	0.9107	1.2463	0.8481	29	0.0032	0.9630	0.8785	1.2727
15	9.9520	0.9138	1.2435	0.8681	30	0.0051	0.9632	0.8606	1.2760
16	9.9535	0.9165	1.2405	0.8870	Dec. 1	0.0068	0.9628	0.8418	1.2791
17	9.9552	0.9185	1.2373	0.9051	2	0.0082	0.9621	0.8220	1.2821
18	9.9570	0.9194	1.2341	0.9223	3	0.0094	0.9614	0.8011	1.2850
19	9.9587	0.9195	1.2306	0.9387	4	0.0103	0.9609	0.7789	1.2876
20	9.9601	0.9190	1.2270	0.9545	5	0.0110	0.9610	0.7556	1.2902
21	9.9611	0.9183	1.2232	0.9695	6	0.0117	0.9620	0.7305	1.2925
22	9.9618	0.9177	1.2193	0.9839	7	0.0126	0.9638	0.7039	1.2948
23	9.9622	0.9174	1.2152	0.9978	8	0.0138	0.9661	0.6754	1.2968
24	9.9624	0.9180	1.2109	1.0111	9	0.0154	0.9684	0.6447	1.2988
25	9.9626	0.9191	1.2064	1.0239	10	0.0173	0.9704	0.6116	1.3006
26	9.9629	0.9207	1.2018	1.0362	11	0.0195	0.9717	0.5755	1.3022
27	9.9634	0.9228	1.1970	1.0480	12	0.0217	0.9721	0.5359	1.3037
28	9.9640	0.9252	1.1919	1.0594	13	0.0238	0.9717	0.4923	1.3051
29	9.9649	0.9276	1.1867	1.0704	14	0.0256	0.9708	0.4437	1.3063
30	9.9661	0.9299	1.1813	1.0810	15	0.0270	0.9695	0.3888	1.3074
31	9.9675	0.9320	1.1757	1.0912	16	0.0281	0.9685	0.3257	1.3083
Nov. 1	9.9690	0.9336	1.1699	1.1011	17	0.0290	0.9677	0.2516	1.3091
2	9.9707	0.9345	1.1638	1.1106	18	0.0297	0.9676	0.1623	1.3098
3	9.9723	0.9349	1.1575	1.1198	19	0.0304	0.9682	0.0492	1.3103
4	9.9737	0.9345	1.1510	1.1286	20	0.0312	0.9691	9.8960	1.3107
5	9.9749	0.9339	1.1443	1.1372	21	0.0322	0.9704	9.6571	1.3110
6	9.9757	0.9333	1.1373	1.1455	22	0.0334	0.9720	9.0792	1.3111
7	9.9762	0.9335	1.1300	1.1535	23	0.0348	0.9733	9.3304 _n	1.3111
8	9.9766	0.9344	1.1226	1.1612	24	0.0364	0.9744	9.7388 _n	1.3109
9	9.9771	0.9362	1.1148	1.1686	25	0.0381	0.9750	9.9455 _n	1.3106
10	9.9779	0.9389	1.1068	1.1759	26	0.0400	0.9752	0.0846 _n	1.3102
11	9.9790	0.9419	1.0984	1.1828	27	0.0418	0.9746	0.1898 _n	1.3096
12	9.9806	0.9448	1.0898	1.1895	28	0.0435	0.9736	0.2744 _n	1.3089
13	9.9825	0.9473	1.0808	1.1960	29	0.0450	0.9722	0.3450 _n	1.3081
14	9.9847	0.9490	1.0715	1.2023	30	0.0463	0.9706	0.4055 _n	1.3071
15	9.9867	0.9496	1.0619	1.2083	31	0.0472	0.9692	0.4586 _n	1.3060
16	9.9886	0.9495	1.0519	1.2142	32	0.0480	0.9682	0.5058 _n	1.3047

$E = +0^{\circ}.001$

BESSELIAN STAR NUMBERS, AND
TERMS OF SHORT PERIOD IN NUTATION, 1958
FOR 0^h UNIVERSAL TIME

Date		A		B		C		D		dψ	dε
				"		"		"		"	"
Jan.	0	+0.2138	29	+7.85	3	- 2.95	33	+20.21	6	-0.19	+0.03
	1	0.2167	36	7.88	3	3.28	33	20.15	6	0.22	0.00
	2	0.2203	42	7.91	2	3.61	33	20.09	8	0.21	-0.03
	3	0.2245	49	7.93	1	3.94	33	20.01	8	0.16	0.06
	4	0.2294	51	7.94	0	4.27	32	19.93	8	-0.09	0.07
	5	+0.2345	50	+7.94	3	- 4.59	32	+19.85	9	0.00	-0.07
	6	0.2395	45	7.91	3	4.91	33	19.76	10	+0.09	0.05
	7	0.2440	37	7.88	5	5.24	32	19.66	11	0.15	-0.02
	8	0.2477	28	7.83	4	5.56	31	19.55	11	0.17	+0.02
	9	0.2505	21	7.79	2	5.87	32	19.44	11	0.14	0.05
	10	+0.2526	17	+7.77	2	- 6.19	31	+19.33	13	+0.08	+0.07
	11	0.2543	17	7.75	1	6.50	32	19.20	13	0.00	0.08
	12	0.2560	21	7.76	2	6.82	31	19.07	13	-0.07	0.06
	13	0.2581	28	7.78	3	7.13	30	18.94	14	0.13	+0.03
	14	0.2609	36	7.81	2	7.43	31	18.80	15	0.14	0.00
	15	+0.2645	43	+7.83	2	- 7.74	30	+18.65	15	-0.12	-0.04
	16	0.2688	47	7.85	0	8.04	30	18.50	16	-0.06	0.07
	17	0.2735	46	7.85	1	8.34	30	18.34	17	+0.02	0.08
	18	0.2781	42	7.84	3	8.64	30	18.17	17	0.10	0.07
	19	0.2823	38	7.81	4	8.94	29	18.00	17	0.16	0.06
	20	+0.2861	30	+7.77	4	- 9.23	29	+17.83	18	+0.19	-0.03
	21	0.2891	24	7.73	5	9.52	28	17.65	19	0.20	0.00
	22	0.2915	19	7.68	3	9.80	29	17.46	19	0.17	+0.03
	23	0.2934	15	7.65	3	10.09	28	17.27	20	0.12	0.05
	24	0.2949	13	7.62	1	10.37	27	17.07	20	+0.05	0.07
	25	+0.2962	13	+7.61	1	-10.64	27	+16.87	21	-0.04	+0.07
	26	0.2975	15	7.60	1	10.91	27	16.66	22	0.11	0.06
	27	0.2990	20	7.61	1	11.18	27	16.44	21	0.18	0.04
	28	0.3010	26	7.62	2	11.45	26	16.23	23	0.22	+0.01
	29	0.3036	32	7.64	1	11.71	26	16.00	23	0.23	-0.02
	30	+0.3068	39	+7.65	1	-11.97	25	+15.77	23	-0.20	-0.05
	31	0.3107	45	7.66	1	12.22	26	15.54	24	0.13	0.07
Feb.	1	0.3152	44	7.65	3	12.48	24	15.30	24	-0.04	0.07
	2	0.3196	40	7.62	4	12.72	24	15.06	25	+0.05	0.06
	3	0.3236	33	7.58	5	12.96	24	14.81	25	0.12	-0.03
	4	+0.3269	25	+7.53	5	-13.20	24	+14.56	26	+0.16	0.00
	5	0.3294	16	7.48	4	13.44	23	14.30	26	0.15	+0.04
	6	0.3310	9	7.44	3	13.67	22	14.04	27	0.11	0.07
	7	0.3319	9	7.41	1	13.89	22	13.77	27	+0.03	0.08
	8	0.3328	11	7.40	1	14.11	22	13.50	27	-0.05	0.07
	9	+0.3339	19	+7.41	3	-14.33	21	+13.23	28	-0.11	+0.05
	10	0.3358	26	7.44	2	14.54	21	12.95	28	0.13	+0.01
	11	0.3384	32	7.46	2	14.75	20	12.67	29	0.12	-0.03
	12	0.3416	38	7.48	0	14.95	20	12.38	29	-0.07	0.06
	13	0.3454	38	7.48	2	15.15	20	12.09	29	+0.01	0.08
	14	+0.3492	36	+7.46	2	-15.35	18	+11.80	30	+0.09	-0.08
	15	+0.3528		+7.44		-15.53		+11.50		+0.16	-0.06

E=+0^s.002

BESSELIAN STAR NUMBERS, AND TERMS OF SHORT PERIOD IN NUTATION, 1958

253

FOR 0^h UNIVERSAL TIME

Date		A	B	C	D	$d\psi$	$d\epsilon$
			"	"	"	"	"
Feb.	15	+0.3528 ₃₀	+7.44 ₄	-15.53 ₁₉	+11.50 ₃₀	+0.16	-0.06
	16	0.3558 ₂₃	7.40 ₅	15.72 ₁₈	11.20 ₃₀	0.20	0.04
	17	0.3581 ₁₆	7.35 ₄	15.90 ₁₇	10.90 ₃₁	0.21	-0.01
	18	0.3597 ₁₂	7.31 ₃	16.07 ₁₇	10.59 ₃₁	0.18	+0.02
	19	0.3609 ₇	7.28 ₃	16.24 ₁₆	10.28 ₃₁	0.14	0.05
	20	+0.3616 ₅	+7.25 ₂	-16.40 ₁₆	+ 9.97 ₃₂	+0.07	+0.06
	21	0.3621 ₄	7.23 ₁	16.56 ₁₅	9.65 ₃₁	-0.01	0.07
	22	0.3625 ₇	7.22 ₁	16.71 ₁₅	9.34 ₃₃	0.09	0.06
	23	0.3632 ₉	7.23 ₁	16.86 ₁₄	9.01 ₃₂	0.15	0.05
	24	0.3641 ₁₅	7.24 ₂	17.00 ₁₄	8.69 ₃₃	0.20	+0.02
	25	+0.3656 ₂₁	+7.26 ₂	-17.14 ₁₃	+ 8.36 ₃₃	-0.22	-0.01
	26	0.3677 ₂₉	7.28 ₂	17.27 ₁₃	8.03 ₃₃	0.21	0.04
	27	0.3706 ₃₃	7.30 ₀	17.40 ₁₂	7.70 ₃₃	0.16	0.06
	28	0.3739 ₃₅	7.30 ₁	17.52 ₁₂	7.37 ₃₄	-0.09	0.07
Mar.	1	0.3774 ₃₄	7.29 ₃	17.64 ₁₁	7.03 ₃₃	0.00	0.07
	2	+0.3808 ₂₈	+7.26 ₄	-17.75 ₁₀	+ 6.70 ₃₄	+0.08	-0.05
	3	0.3836 ₂₀	7.22 ₅	17.85 ₁₀	6.36 ₃₅	0.13	-0.01
	4	0.3856 ₁₂	7.17 ₄	17.95 ₉	6.01 ₃₄	0.14	+0.03
	5	0.3868 ₅	7.13 ₂	18.04 ₉	5.67 ₃₄	0.11	0.06
	6	0.3873 ₂	7.11 ₁	18.13 ₈	5.33 ₃₅	+0.05	0.08
	7	+0.3875 ₄	+7.10 ₂	-18.21 ₈	+ 4.98 ₃₅	-0.03	+0.08
	8	0.3879 ₉	7.12 ₃	18.29 ₇	4.63 ₃₅	0.10	0.06
	9	0.3888 ₁₇	7.15 ₄	18.36 ₇	4.28 ₃₅	0.13	+0.02
	10	0.3905 ₂₅	7.19 ₃	18.43 ₆	3.93 ₃₅	0.13	-0.02
	11	0.3930 ₃₂	7.22 ₂	18.49 ₅	3.58 ₃₅	0.09	0.05
	12	+0.3962 ₃₃	+7.24 ₀	-18.54 ₅	+ 3.23 ₃₅	-0.01	-0.07
	13	0.3995 ₃₂	7.24 ₀	18.59 ₅	2.88 ₃₅	+0.08	0.08
	14	0.4027 ₂₆	7.24 ₃	18.64 ₃	2.53 ₃₆	0.15	0.07
	15	0.4053 ₂₀	7.21 ₃	18.67 ₃	2.17 ₃₅	0.20	0.05
	16	0.4073 ₁₃	7.18 ₃	18.70 ₃	1.82 ₃₆	0.22	-0.02
	17	+0.4086 ₇	+7.15 ₂	-18.73 ₂	+ 1.46 ₃₅	+0.21	+0.02
	18	0.4093 ₃	7.13 ₂	18.75 ₂	1.11 ₃₆	0.16	0.04
	19	0.4096 ₁	7.11 ₀	18.77 ₁	0.75 ₃₅	0.10	0.06
	20	0.4097 ₁	7.11 ₁	18.78 ₀	0.40 ₃₆	+0.02	0.07
	21	0.4098 ₂	7.12 ₁	18.78 ₀	+ 0.04 ₃₅	-0.06	0.06
	22	+0.4100 ₆	+7.13 ₃	-18.78 ₁	- 0.31 ₃₆	-0.12	+0.05
	23	0.4106 ₁₀	7.16 ₃	18.77 ₁	0.67 ₃₅	0.18	+0.03
	24	0.4116 ₁₆	7.19 ₄	18.76 ₂	1.02 ₃₅	0.21	0.00
	25	0.4132 ₂₂	7.23 ₃	18.74 ₃	1.37 ₃₆	0.21	-0.03
	26	0.4154 ₂₈	7.26 ₃	18.71 ₃	1.73 ₃₅	0.18	0.05
	27	+0.4182 ₃₁	+7.29 ₁	-18.68 ₃	- 2.08 ₃₅	-0.11	-0.07
	28	0.4213 ₃₂	7.30 ₁	18.65 ₄	2.43 ₃₅	-0.04	0.07
	29	0.4245 ₂₈	7.29 ₂	18.61 ₅	2.78 ₃₅	+0.04	0.06
	30	0.4273 ₂₁	7.27 ₂	18.56 ₅	3.13 ₃₅	0.10	-0.03
	31	0.4294 ₁₄	7.25 ₃	18.51 ₆	3.48 ₃₄	0.12	+0.01
Apr.	1	+0.4308 ₆	+7.22 ₁	-18.45 ₆	- 3.82 ₃₅	+0.11	+0.05
	2	+0.4314	+7.21	-18.39	- 4.17	+0.06	+0.07

BESSELIAN STAR NUMBERS, AND
TERMS OF SHORT PERIOD IN NUTATION, 1958
FOR 0^h UNIVERSAL TIME

Date		A	B	C	D	dψ	dε
			"	"	"	"	"
Apr.	1	+0.4308 ₆	+7.22 ₁	-18.45 ₆	- 3.82 ₃₅	+0.11	+0.05
	2	0.4314 ₂	7.21 ₀	18.39 ₇	4.17 ₃₄	+0.06	0.07
	3	0.4316 ₃	7.21 ₃	18.32 ₈	4.51 ₃₅	-0.02	0.08
	4	0.4319 ₆	7.24 ₄	18.24 ₈	4.86 ₃₄	0.09	0.07
	5	0.4325 ₁₅	7.28 ₆	18.16 ₈	5.20 ₃₄	0.14	+0.04
	6	+0.4340 ₂₅	+7.34 ₅	-18.08 ₉	- 5.54 ₃₃	-0.15	0.00
	7	0.4365 ₃₁	7.39 ₅	17.99 ₁₀	5.87 ₃₄	0.12	-0.04
	8	0.4396 ₃₆	7.44 ₂	17.89 ₁₀	6.21 ₃₃	+0.05	0.07
	9	0.4432 ₃₅	7.46 ₂	17.79 ₁₀	6.54 ₃₄	+0.04	0.08
	10	0.4467 ₃₁	7.48 ₁	17.69 ₁₁	6.88 ₃₂	0.13	0.08
	11	+0.4498 ₂₅	+7.47 ₁	-17.58 ₁₂	- 7.20 ₃₃	+0.20	-0.06
	12	0.4523 ₁₈	7.46 ₂	17.46 ₁₂	7.53 ₃₃	0.23	-0.02
	13	0.4541 ₁₁	7.44 ₁	17.34 ₁₂	7.86 ₃₂	0.23	+0.01
	14	0.4552 ₆	7.43 ₀	17.22 ₁₃	8.18 ₃₂	0.19	0.04
	15	0.4558 ₄	7.43 ₁	17.09 ₁₄	8.50 ₃₁	0.13	0.06
	16	+0.4562 ₄	+7.44 ₂	-16.95 ₁₄	- 8.81 ₃₂	+0.05	+0.07
	17	0.4566 ₄	7.46 ₃	16.81 ₁₅	9.13 ₃₁	-0.02	0.07
	18	0.4570 ₁₀	7.49 ₄	16.66 ₁₅	9.44 ₃₁	0.10	0.06
	19	0.4580 ₁₃	7.53 ₅	16.51 ₁₅	9.75 ₃₀	0.15	0.03
	20	0.4593 ₁₉	7.58 ₅	16.36 ₁₆	10.05 ₃₁	0.19	+0.01
	21	+0.4612 ₂₄	+7.63 ₄	-16.20 ₁₇	-10.36 ₂₉	-0.19	-0.02
	22	0.4636 ₃₁	7.67 ₄	16.03 ₁₆	10.65 ₃₀	0.17	0.05
	23	0.4667 ₃₄	7.71 ₃	15.87 ₁₈	10.95 ₂₉	0.12	0.06
	24	0.4701 ₃₆	7.74 ₁	15.69 ₁₇	11.24 ₂₉	-0.05	0.07
	25	0.4737 ₃₄	7.75 ₀	15.52 ₁₉	11.53 ₂₉	+0.02	0.06
	26	+0.4771 ₂₈	+7.75 ₁	-15.33 ₁₈	-11.82 ₂₈	+0.08	-0.04
	27	0.4799 ₂₁	7.74 ₁	15.15 ₁₉	12.10 ₂₈	0.12	0.00
	28	0.4820 ₁₄	7.73 ₁	14.96 ₂₀	12.38 ₂₇	0.11	+0.03
	29	0.4834 ₈	7.72 ₁	14.76 ₂₀	12.65 ₂₇	+0.07	0.06
	30	0.4842 ₈	7.73 ₃	14.56 ₂₀	12.92 ₂₇	0.00	0.08
May	1	+0.4850 ₁₀	+7.76 ₄	-14.36 ₂₁	-13.19 ₂₇	-0.08	+0.07
	2	0.4860 ₁₉	7.80 ₆	14.15 ₂₁	13.46 ₂₅	0.14	0.05
	3	0.4879 ₂₇	7.86 ₆	13.94 ₂₁	13.71 ₂₆	0.17	+0.02
	4	0.4906 ₃₅	7.92 ₆	13.73 ₂₂	13.97 ₂₅	0.15	-0.02
	5	0.4941 ₄₂	7.98 ₄	13.51 ₂₂	14.22 ₂₅	-0.09	0.06
	6	+0.4983 ₄₃	+8.02 ₃	-13.29 ₂₃	-14.47 ₂₄	0.00	-0.08
	7	0.5026 ₄₂	8.05 ₁	13.06 ₂₃	14.71 ₂₄	+0.09	0.08
	8	0.5068 ₃₅	8.06 ₁	12.83 ₂₃	14.95 ₂₃	0.17	0.06
	9	0.5103 ₂₈	8.05 ₁	12.60 ₂₄	15.18 ₂₃	0.23	-0.04
	10	0.5131 ₂₁	8.04 ₁	12.36 ₂₄	15.41 ₂₃	0.24	0.00
	11	+0.5152 ₁₅	+8.03 ₀	-12.12 ₂₄	-15.64 ₂₂	+0.22	+0.03
	12	0.5167 ₁₁	8.03 ₁	11.88 ₂₅	15.86 ₂₁	0.16	0.05
	13	0.5178 ₁₁	8.04 ₂	11.63 ₂₅	16.07 ₂₁	+0.08	0.07
	14	0.5189 ₁₁	8.06 ₃	11.38 ₂₅	16.28 ₂₁	0.00	0.07
	15	0.5200 ₁₅	8.09 ₄	11.13 ₂₆	16.49 ₂₀	-0.07	0.06
	16	+0.5215 ₂₀	+8.13 ₅	-10.87 ₂₆	-16.69 ₂₀	-0.14	+0.04
	17	+0.5235	+8.18	-10.61	-16.89	-0.17	+0.02

E = +0^m.001

BESSELIAN STAR NUMBERS, AND TERMS OF SHORT PERIOD IN NUTATION, 1958

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FOR 0^h UNIVERSAL TIME

Date		A	B	C	D	dψ	dε
			"	"	"	"	"
May	17	+0.5235 ₂₄	+8.18 ₅	-10.61 ₂₆	-16.89 ₁₉	-0.17	+0.02
	18	0.5259 ₃₂	8.23 ₅	10.35 ₂₇	17.08 ₁₉	0.19	-0.01
	19	0.5291 ₃₇	8.28 ₄	10.08 ₂₆	17.27 ₁₈	0.17	0.04
	20	0.5328 ₄₁	8.32 ₃	9.82 ₂₇	17.45 ₁₈	0.12	0.06
	21	0.5369 ₄₃	8.35 ₂	9.55 ₂₈	17.63 ₁₇	-0.06	0.07
	22	+0.5412 ₄₁	+8.37 ₀	- 9.27 ₂₇	-17.80 ₁₇	+0.02	-0.06
	23	0.5453 ₃₇	8.37 ₂	9.00 ₂₈	17.97 ₁₆	0.08	0.04
	24	0.5490 ₃₀	8.35 ₁	8.72 ₂₈	18.13 ₁₆	0.12	-0.01
	25	0.5520 ₂₃	8.34 ₁	8.44 ₂₈	18.29 ₁₅	0.12	+0.02
	26	0.5543 ₁₇	8.33 ₀	8.16 ₂₉	18.44 ₁₄	0.09	0.05
	27	+0.5560 ₁₄	+8.33 ₁	- 7.87 ₂₈	-18.58 ₁₅	+0.02	+0.07
	28	0.5574 ₁₅	8.34 ₃	7.59 ₂₉	18.73 ₁₃	-0.05	0.08
	29	0.5589 ₂₁	8.37 ₅	7.30 ₂₉	18.86 ₁₃	0.13	0.06
	30	0.5610 ₃₁	8.42 ₆	7.01 ₃₀	18.99 ₁₃	0.17	+0.03
	31	0.5641 ₃₉	8.48 ₅	6.71 ₂₉	19.12 ₁₂	0.17	-0.01
June	1	+0.5680 ₄₆	+8.53 ₄	- 6.42 ₃₀	-19.24 ₁₁	-0.13	-0.05
	2	0.5726 ₄₉	8.57 ₂	6.12 ₂₉	19.35 ₁₁	-0.05	0.07
	3	0.5775 ₄₉	8.59 ₁	5.83 ₃₀	19.46 ₁₀	+0.04	0.08
	4	0.5824 ₄₅	8.60 ₁	5.53 ₃₀	19.56 ₁₀	0.13	0.07
	5	0.5869 ₃₈	8.59 ₂	5.23 ₃₀	19.66 ₉	0.20	0.05
	6	+0.5907 ₂₉	+8.57 ₁	- 4.93 ₃₁	-19.75 ₉	+0.23	-0.02
	7	0.5936 ₂₃	8.56 ₂	4.62 ₃₀	19.84 ₈	0.22	+0.02
	8	0.5959 ₁₉	8.54 ₁	4.32 ₃₁	19.92 ₈	0.18	0.05
	9	0.5978 ₁₅	8.53 ₁	4.01 ₃₁	20.00 ₇	0.11	0.06
	10	0.5993 ₁₆	8.54 ₂	3.70 ₃₀	20.07 ₆	+0.03	0.07
	11	+0.6009 ₁₈	+8.56 ₂	- 3.40 ₃₁	-20.13 ₆	-0.05	+0.07
	12	0.6027 ₂₃	8.58 ₄	3.09 ₃₁	20.19 ₅	0.12	0.05
	13	0.6050 ₂₈	8.62 ₃	2.78 ₃₁	20.24 ₅	0.17	+0.02
	14	0.6078 ₃₅	8.65 ₄	2.47 ₃₁	20.29 ₄	0.19	0.00
	15	0.6113 ₄₀	8.69 ₃	2.16 ₃₁	20.33 ₄	0.18	-0.03
	16	+0.6153 ₄₅	+8.72 ₂	- 1.85 ₃₁	-20.37 ₃	-0.14	-0.06
	17	0.6198 ₄₇	8.74 ₁	1.54 ₃₂	20.40 ₃	-0.07	0.07
	18	0.6245 ₄₆	8.75 ₁	1.22 ₃₁	20.43 ₂	+0.01	0.07
	19	0.6291 ₄₃	8.74 ₂	0.91 ₃₁	20.45 ₁	0.07	0.05
	20	0.6334 ₃₅	8.72 ₃	0.60 ₃₁	20.46 ₁	0.13	-0.02
	21	+0.6369 ₂₈	+8.69 ₃	- 0.29 ₃₂	-20.47 ₀	+0.14	+0.01
	22	0.6397 ₂₁	8.66 ₂	+ 0.03 ₃₁	20.47 ₀	0.12	0.04
	23	0.6418 ₁₈	8.64 ₁	0.34 ₃₁	20.47 ₁	+0.06	0.07
	24	0.6436 ₁₇	8.63 ₂	0.65 ₃₁	20.46 ₂	-0.02	0.08
	25	0.6453 ₂₁	8.65 ₃	0.96 ₃₂	20.44 ₂	0.10	0.07
	26	+0.6474 ₂₇	+8.68 ₃	+ 1.28 ₃₁	-20.42 ₂	-0.15	+0.04
	27	0.6501 ₃₈	8.71 ₄	1.59 ₃₁	20.40 ₄	0.17	0.00
	28	0.6539 ₄₅	8.75 ₃	1.90 ₃₁	20.36 ₃	0.15	-0.03
	29	0.6584 ₄₉	8.78 ₁	2.21 ₃₁	20.33 ₅	-0.09	0.06
	30	0.6633 ₄₉	8.79 ₀	2.52 ₃₁	20.28 ₄	0.00	0.08
July	1	+0.6682 ₄₈	+8.79 ₂	+ 2.83 ₃₁	-20.24 ₆	+0.09	-0.08
	2	+0.6730	+8.77	+ 3.14	-20.18	+0.17	-0.06

$E = +0^{\circ}.001$

BESSELIAN STAR NUMBERS, AND
TERMS OF SHORT PERIOD IN NUTATION, 1958
FOR 0^h UNIVERSAL TIME

Date		A	B	C	D	dψ	dε
			"	"	"	"	"
July	1	+0.6682 ₄₈	+8.79 ₂	+ 2.83 ₃₁	-20.24 ₆	+0.09	-0.08
	2	0.6730 ₄₀	8.77 ₃	3.14 ₃₁	20.18 ₆	0.17	0.06
	3	0.6770 ₃₃	8.74 ₄	3.45 ₃₀	20.12 ₆	0.21	-0.03
	4	0.6803 ₂₇	8.70 ₃	3.75 ₃₁	20.06 ₇	0.22	+0.01
	5	0.6830 ₂₀	8.67 ₂	4.06 ₃₀	19.99 ₈	0.19	0.04
	6	+0.6850 ₁₆	+8.65 ₂	+ 4.36 ₃₁	-19.91 ₈	+0.13	+0.06
	7	0.6866 ₁₆	8.63 ₀	4.67 ₃₀	19.83 ₉	+0.06	0.07
	8	0.6882 ₁₆	8.63 ₀	4.97 ₃₀	19.74 ₉	-0.03	0.07
	9	0.6898 ₁₉	8.63 ₂	5.27 ₃₀	19.65 ₁₀	0.10	0.06
	10	0.6917 ₂₅	8.65 ₂	5.57 ₃₀	19.55 ₁₀	0.16	+0.04
	11	+0.6942 ₃₀	+8.67 ₂	+ 5.87 ₂₉	-19.45 ₁₁	-0.19	0.00
	12	0.6972 ₃₇	8.69 ₂	6.16 ₃₀	19.34 ₁₂	0.19	-0.02
	13	0.7009 ₄₂	8.71 ₁	6.46 ₂₉	19.22 ₁₂	0.16	0.05
	14	0.7051 ₄₆	8.72 ₀	6.75 ₂₉	19.10 ₁₂	0.10	0.07
	15	0.7097 ₄₅	8.72 ₂	7.04 ₂₉	18.98 ₁₃	-0.02	0.07
	16	+0.7142 ₄₂	+8.70 ₄	+ 7.33 ₂₈	-18.85 ₁₄	+0.05	-0.06
	17	0.7184 ₃₆	8.66 ₄	7.61 ₂₉	18.71 ₁₄	0.12	-0.03
	18	0.7220 ₂₇	8.62 ₅	7.90 ₂₈	18.57 ₁₅	0.15	0.00
	19	0.7247 ₂₀	8.57 ₄	8.18 ₂₈	18.42 ₁₅	0.14	+0.04
	20	0.7267 ₁₅	8.53 ₂	8.46 ₂₈	18.27 ₁₅	0.09	0.06
	21	+0.7282 ₁₃	+8.51 ₀	+ 8.74 ₂₈	-18.12 ₁₆	+0.02	+0.08
	22	0.7295 ₁₆	8.51 ₁	9.02 ₂₇	17.96 ₁₇	-0.06	0.07
	23	0.7311 ₂₁	8.52 ₂	9.29 ₂₇	17.79 ₁₇	0.12	0.05
	24	0.7332 ₃₀	8.54 ₂	9.56 ₂₇	17.62 ₁₈	0.16	+0.01
	25	0.7362 ₃₈	8.56 ₂	9.83 ₂₆	17.44 ₁₈	0.15	-0.02
	26	+0.7400 ₄₂	+8.58 ₁	+10.09 ₂₇	-17.26 ₁₈	-0.10	-0.06
	27	0.7442 ₄₅	8.59 ₁	10.36 ₂₆	17.08 ₂₀	-0.02	0.07
	28	0.7487 ₄₂	8.58 ₃	10.62 ₂₅	16.88 ₁₉	+0.07	0.07
	29	0.7529 ₃₇	8.55 ₄	10.87 ₂₆	16.69 ₂₀	0.14	0.06
	30	0.7566 ₃₀	8.51 ₄	11.13 ₂₅	16.49 ₂₁	0.19	0.04
Aug.	31	+0.7596 ₂₃	+8.47 ₅	+11.38 ₂₅	-16.28 ₂₀	+0.21	-0.01
	1	0.7619 ₁₆	8.42 ₃	11.63 ₂₄	16.08 ₂₂	0.19	+0.03
	2	0.7635 ₁₂	8.39 ₄	11.87 ₂₄	15.86 ₂₂	0.14	0.05
	3	0.7647 ₁₀	8.35 ₁	12.11 ₂₄	15.64 ₂₂	+0.08	0.07
	4	0.7657 ₁₀	8.34 ₁	12.35 ₂₃	15.42 ₂₃	0.00	0.07
	5	+0.7667 ₁₂	+8.33 ₁	+12.58 ₂₄	-15.19 ₂₃	-0.08	+0.06
	6	0.7679 ₁₇	8.34 ₁	12.82 ₂₂	14.96 ₂₃	0.14	0.04
	7	0.7696 ₂₁	8.35 ₁	13.04 ₂₃	14.73 ₂₄	0.19	+0.02
	8	0.7717 ₂₇	8.36 ₂	13.27 ₂₂	14.49 ₂₅	0.20	-0.01
	9	0.7744 ₃₃	8.38 ₀	13.49 ₂₂	14.24 ₂₅	0.18	0.04
	10	+0.7777 ₃₈	+8.38 ₀	+13.71 ₂₁	-13.99 ₂₅	-0.14	-0.06
	11	0.7815 ₃₉	8.38 ₃	13.92 ₂₁	13.74 ₂₅	-0.06	0.07
	12	0.7854 ₃₇	8.35 ₃	14.13 ₂₀	13.49 ₂₆	+0.01	0.06
	13	0.7891 ₃₂	8.32 ₅	14.33 ₂₀	13.23 ₂₇	0.09	0.05
	14	0.7923 ₂₄	8.27 ₅	14.53 ₂₀	12.96 ₂₆	0.13	-0.01
	15	+0.7947 ₁₆	+8.22 ₄	+14.73 ₂₀	-12.70 ₂₈	+0.14	+0.02
	16	+0.7963	+8.18	+14.93	-12.42	+0.11	+0.06

E=+0^s.001

BESSELIAN STAR NUMBERS, AND TERMS OF SHORT PERIOD IN NUTATION, 1958

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FOR 0^h UNIVERSAL TIME

Date		A		B		C		D		dψ	dε
				"		"		"		"	"
Aug.	16	+0.7963	9	+8.18	3	+14.93	18	-12.42	27	+0.11	+0.06
	17	0.7972	6	8.15	2	15.11	19	12.15	28	+0.05	0.07
	18	0.7978	8	8.13	0	15.30	18	11.87	28	-0.03	0.08
	19	0.7986	13	8.13	2	15.48	18	11.59	29	0.10	0.06
	20	0.7999	20	8.15	3	15.66	17	11.30	28	0.14	+0.03
	21	+0.8019	29	+8.18	2	+15.83	17	-11.02	30	-0.14	-0.01
	22	0.8048	34	8.20	1	16.00	16	10.72	29	0.10	0.05
	23	0.8082	37	8.21	1	16.16	16	10.43	30	-0.03	0.07
	24	0.8119	36	8.20	2	16.32	15	10.13	30	+0.05	0.08
	25	0.8155	31	8.18	4	16.47	15	9.83	30	0.13	0.07
	26	+0.8186	24	+8.14	3	+16.62	15	- 9.53	31	+0.19	-0.04
	27	0.8210	16	8.11	5	16.77	14	9.22	31	0.22	-0.02
	28	0.8226	11	8.06	3	16.91	13	8.91	31	0.20	+0.02
	29	0.8237	6	8.03	3	17.04	13	8.60	31	0.16	0.04
	30	0.8243	3	8.00	2	17.17	13	8.29	32	0.10	0.06
	31	+0.8246	4	+7.98	0	+17.30	12	- 7.97	32	+0.02	+0.07
Sept.	1	0.8250	4	7.98	0	17.42	12	7.65	32	-0.05	0.06
	2	0.8254	8	7.98	2	17.54	11	7.33	33	0.12	0.05
	3	0.8262	13	8.00	1	17.65	10	7.00	32	0.17	+0.03
	4	0.8275	18	8.01	3	17.75	10	6.68	33	0.20	0.00
	5	+0.8293	24	+8.04	1	+17.85	10	- 6.35	33	-0.19	-0.03
	6	0.8317	28	8.05	1	17.95	9	6.02	33	0.16	0.05
	7	0.8345	32	8.06	1	18.04	9	5.69	34	0.10	0.07
	8	0.8377	32	8.05	2	18.13	8	5.35	33	-0.03	0.07
	9	0.8409	27	8.03	3	18.21	7	5.02	34	+0.05	0.06
	10	+0.8436	22	+8.00	4	+18.28	7	- 4.68	34	+0.10	-0.03
	11	0.8458	12	7.96	4	18.35	7	4.34	34	0.13	+0.01
	12	0.8470	7	7.92	3	18.42	6	4.00	34	0.11	0.04
	13	0.8477	1	7.89	1	18.48	5	3.66	34	+0.06	0.07
	14	0.8478	1	7.88	1	18.53	5	3.32	35	-0.02	0.08
	15	+0.8479	7	+7.89	2	+18.58	4	- 2.97	34	-0.09	+0.07
	16	0.8486	13	7.91	4	18.62	4	2.63	35	0.14	+0.04
	17	0.8499	22	7.95	4	18.66	4	2.28	35	0.15	0.00
	18	0.8521	30	7.99	3	18.70	2	1.93	34	0.12	-0.03
	19	0.8551	33	8.02	1	18.72	3	1.59	35	-0.05	0.06
	20	+0.8584	33	+8.03	0	+18.75	1	- 1.24	35	+0.04	-0.08
	21	0.8617	30	8.03	2	18.76	1	0.89	35	0.12	0.07
	22	0.8647	22	8.01	3	18.77	1	0.54	35	0.19	0.05
	23	0.8669	15	7.98	3	18.78	0	- 0.19	35	0.23	-0.02
	24	0.8684	8	7.95	2	18.78	1	+ 0.16	35	0.22	+0.01
	25	+0.8692	3	+7.93	2	+18.77	1	+ 0.51	35	+0.19	+0.04
	26	0.8695	1	7.91	0	18.76	1	0.86	35	0.12	0.06
	27	0.8696	1	7.91	1	18.75	2	1.21	35	+0.05	0.07
	28	0.8697	2	7.92	2	18.73	3	1.56	35	-0.03	0.06
	29	0.8699	5	7.94	3	18.70	3	1.91	35	0.10	0.05
	30	+0.8704	10	+7.97	3	+18.67	4	+ 2.26	35	-0.15	+0.03
Oct.	1	+0.8714		+8.00		+18.63		+ 2.61		-0.18	+0.01

$E = +0^{\circ}.001$

BESSELIAN STAR NUMBERS, AND
TERMS OF SHORT PERIOD IN NUTATION, 1958
FOR 0^h UNIVERSAL TIME

Date		A	B	C	D	dψ	dε
			"	"	"	"	"
Oct.	1	+0.8714	+8.00	+18.63	+ 2.61	-0.18	+0.01
	2	0.8729	8.04	18.58	2.95	0.19	-0.02
	3	0.8749	8.07	18.53	3.30	0.17	0.05
	4	0.8774	8.10	18.48	3.65	0.12	0.07
	5	0.8803	8.11	18.42	3.99	-0.05	0.07
	6	+0.8833	+8.11	+18.35	+ 4.34	+0.02	-0.06
	7	0.8862	8.10	18.28	4.68	0.08	0.04
	8	0.8885	8.08	18.21	5.02	0.11	-0.01
	9	0.8901	8.06	18.12	5.37	0.11	+0.03
	10	0.8910	8.04	18.04	5.71	+0.06	0.06
	11	+0.8913	+8.04	+17.94	+ 6.04	-0.01	+0.08
	12	0.8915	8.06	17.84	6.38	0.08	0.08
	13	0.8921	8.09	17.74	6.72	0.14	0.05
	14	0.8933	8.14	17.63	7.05	0.17	+0.02
	15	0.8954	8.20	17.52	7.38	0.15	-0.02
	16	+0.8984	+8.25	+17.40	+ 7.71	-0.09	-0.06
	17	0.9021	8.29	17.27	8.04	0.00	0.08
	18	0.9058	8.31	17.14	8.36	+0.10	0.08
	19	0.9093	8.31	17.01	8.68	0.18	0.06
	20	0.9123	8.30	16.87	9.00	0.23	-0.03
	21	+0.9144	+8.29	+16.72	+ 9.32	+0.24	0.00
	22	0.9158	8.27	16.57	9.64	0.22	+0.03
	23	0.9166	8.27	16.41	9.95	0.16	0.06
	24	0.9171	8.28	16.25	10.26	+0.08	0.07
	25	0.9175	8.30	16.09	10.57	0.00	0.06
	26	+0.9182	+8.33	+15.91	+10.87	-0.07	+0.05
	27	0.9192	8.37	15.74	11.17	0.13	0.04
	28	0.9205	8.42	15.56	11.47	0.16	+0.01
	29	0.9224	8.46	15.37	11.76	0.17	-0.01
	30	0.9249	8.51	15.18	12.05	0.16	0.04
Nov.	31	+0.9278	+8.55	+14.99	+12.34	-0.12	-0.06
	1	0.9312	8.58	14.79	12.62	-0.06	0.07
	2	0.9348	8.60	14.58	12.90	0.00	0.06
	3	0.9382	8.61	14.37	13.18	+0.06	0.05
	4	0.9413	8.60	14.16	13.45	0.10	-0.02
	5	+0.9438	+8.59	+13.94	+13.72	+0.10	+0.02
	6	0.9455	8.58	13.72	13.98	0.07	0.05
	7	0.9467	8.58	13.49	14.24	+0.01	0.07
	8	0.9476	8.60	13.26	14.49	-0.07	0.08
	9	0.9487	8.63	13.03	14.75	0.14	0.06
	10	+0.9503	+8.69	+12.79	+14.99	-0.18	+0.03
	11	0.9529	8.75	12.54	15.23	0.18	-0.01
	12	0.9563	8.81	12.30	15.47	0.14	0.04
	13	0.9606	8.86	12.04	15.70	-0.05	0.07
	14	0.9653	8.89	11.79	15.93	+0.05	0.08
	15	+0.9699	+8.90	+11.53	+16.16	+0.15	-0.07
	16	+0.9740	+8.90	+11.27	+16.38	+0.22	-0.05

BESSELIAN STAR NUMBERS, AND TERMS OF SHORT PERIOD IN NUTATION, 1958

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FOR 0^h UNIVERSAL TIME

Date		A	B	C	D	dψ	de
		"					
Nov.	16	+0.9740	+8.90	+11.27	+16.38	+0.22	-0.05
	17	0.9773 ³³	8.89 ¹	11.00 ²⁷	16.59 ²¹	0.25	-0.01
	18	0.9799 ²⁶	8.88 ¹	10.73 ²⁷	16.80 ²¹	0.24	+0.02
	19	0.9817 ¹⁸	8.88 ⁰	10.46 ²⁷	17.00 ²⁰	0.19	0.05
	20	0.9831 ¹⁴	8.88 ⁰	10.18 ²⁸	17.20 ²⁰	0.12	0.06
					19		
	21	+0.9843 ¹²	+8.90 ²	+ 9.90 ²⁸	+17.39 ¹⁹	+0.03	+0.07
	22	0.9857 ¹⁴	8.93 ³	9.62 ²⁸	17.58 ¹⁸	-0.04	0.06
	23	0.9873 ¹⁶	8.96 ³	9.34 ²⁹	17.76 ¹⁸	0.11	0.04
	24	0.9895 ²²	9.01 ⁵	9.05 ²⁹	17.94 ¹⁷	0.15	+0.02
	25	0.9921 ²⁶	9.05 ⁴	8.75 ³⁰	18.11 ¹⁷	0.16	-0.01
					19		
	26	+0.9953 ³²	+9.10 ⁵	+ 8.46 ²⁹	+18.28 ¹⁶	-0.15	-0.03
	27	0.9990 ³⁷	9.14 ⁴	8.16 ³⁰	18.44 ¹⁵	0.12	0.05
	28	1.0032 ⁴²	9.17 ³	7.86 ³⁰	18.59 ¹⁵	-0.07	0.07
	29	1.0074 ⁴²	9.18 ¹	7.56 ³⁰	18.74 ¹⁵	0.00	0.06
	30	1.0117 ⁴³	9.19 ¹	7.25 ³¹	18.88 ¹⁴	+0.06	0.05
					14		
Dec.	1	+1.0157 ⁴⁰	+9.18 ¹	+ 6.95 ³⁰	+19.02 ¹⁴	+0.10	-0.03
	2	1.0191 ³⁴	9.17 ¹	6.64 ³¹	19.15 ¹³	0.11	+0.01
	3	1.0219 ²⁸	9.15 ²	6.33 ³¹	19.27 ¹²	0.09	0.04
	4	1.0240 ²¹	9.14 ¹	6.01 ³²	19.39 ¹²	+0.04	0.06
	5	1.0257 ¹⁷	9.14 ⁰	5.70 ³¹	19.51 ¹²	-0.04	0.08
					10		
	6	+1.0273 ¹⁶	+9.16 ²	+ 5.38 ³²	+19.61 ¹⁰	-0.12	+0.07
	7	1.0295 ²²	9.20 ⁴	5.06 ³²	19.71 ¹⁰	0.17	0.04
	8	1.0323 ²⁸	9.25 ⁵	4.74 ³²	19.81 ⁹	0.20	+0.01
	9	1.0360 ³⁷	9.30 ⁵	4.41 ³³	19.90 ⁹	0.17	-0.03
	10	1.0407 ⁴⁷	9.34 ⁴	4.09 ³²	19.98 ⁸	0.10	0.06
					8		
	11	+1.0459 ⁵²	+9.37 ³	+ 3.76 ³³	+20.06 ⁶	-0.01	-0.08
	12	1.0512 ⁵³	9.38 ¹	3.44 ³²	20.12 ⁷	+0.09	0.08
	13	1.0563 ⁵¹	9.37 ¹	3.11 ³³	20.19 ⁵	0.18	0.06
	14	1.0607 ⁴⁴	9.35 ²	2.78 ³³	20.24 ⁵	0.23	-0.03
	15	1.0642 ³⁵	9.32 ³	2.45 ³³	20.29 ⁵	0.24	+0.01
					5		
	16	+1.0669 ²⁷	+9.30 ²	+ 2.12 ³³	+20.34 ⁴	+0.21	+0.04
	17	1.0690 ²¹	9.28 ²	1.79 ³³	20.38 ³	0.14	0.06
	18	1.0708 ¹⁸	9.28 ⁰	1.45 ³⁴	20.41 ³	+0.06	0.07
	19	1.0726 ¹⁸	9.29 ¹	1.12 ³³	20.43 ²	-0.02	0.07
	20	1.0745 ¹⁹	9.31 ²	0.79 ³³	20.45 ²	0.09	0.05
					1		
	21	+1.0770 ²⁵	+9.34 ³	+ 0.45 ³⁴	+20.46 ¹	-0.14	+0.03
	22	1.0799 ²⁹	9.38 ⁴	+ 0.12 ³³	20.47 ¹	0.16	0.00
	23	1.0834 ³⁵	9.40 ²	- 0.21 ³³	20.47 ⁰	0.16	-0.03
	24	1.0874 ⁴⁰	9.43 ³	0.55 ³⁴	20.46 ¹	0.13	0.05
	25	1.0917 ⁴³	9.44 ¹	0.88 ³³	20.45 ¹	0.08	0.06
					2		
	26	+1.0964 ⁴⁷	+9.45 ¹	- 1.21 ³³	+20.43 ²	-0.01	-0.07
	27	1.1010 ⁴⁶	9.43 ²	1.55 ³⁴	20.40 ³	+0.05	0.06
	28	1.1054 ⁴⁴	9.41 ²	1.88 ³³	20.37 ³	0.10	0.04
	29	1.1092 ³⁸	9.41 ³	2.21 ³³	20.33 ⁴	0.13	-0.01
	30	1.1124 ³²	9.38 ³	2.54 ³³	20.28 ⁵	0.12	+0.03
					5		
	31	+1.1149 ²⁵	+9.32 ³	- 2.87 ³³	+20.23 ⁶	+0.07	+0.06
	32	+1.1168 ¹⁹	+9.29 ³	- 3.20 ³³	+20.17 ⁶	0.00	+0.07

FOR 0^h UNIVERSAL TIME

Date (Sid. Hr.)	τ	f	f'	G		H		Log g	Log h	i	Log i	
		In Time	In Time	In Arc	In Time	In Arc	In Time					
		^y	^s	^s	[°] [']	^h ^m	[°] [']	^h ^m				
Jan.	0	-0.0024	+0.671	-0.012	61 22	4 05.4	351 41	23 26.7	0.9513	1.3103	-1.28	0.1075 n
	1	+0.0004	0.681	0.013	61 08	4 04.5	350 45	23 23.0	0.9540	1.3101	1.42	0.1535 n
	2	0.0031	0.692	0.013	60 49	4 03.3	349 48	23 19.2	0.9569	1.3098	1.57	0.1948 n
	3	0.0059	0.702	0.010	60 26	4 01.7	348 52	23 15.5	0.9599	1.3096	1.71	0.2325 n
	4	0.0086	0.712	-0.005	59 55	3 59.7	347 55	23 11.7	0.9626	1.3093	1.85	0.2672 n
h (7.0)	5	0.0113	+0.722	0.000	59 22	3 57.4	346 59	23 07.9	0.9649	1.3091	-1.99	0.2991 n
	6	0.0141	0.733	+0.005	58 45	3 55.0	346 02	23 04.1	0.9663	1.3087	2.13	0.3286 n
	7	0.0168	0.743	0.009	58 10	3 52.6	345 05	23 00.3	0.9671	1.3084	2.27	0.3562 n
	8	0.0195	0.753	0.010	57 38	3 50.5	344 08	22 56.6	0.9673	1.3081	2.41	0.3820 n
	9	0.0223	0.763	0.009	57 12	3 48.9	343 11	22 52.8	0.9671	1.3077	2.55	0.4060 n
	10	0.0250	+0.773	+0.005	56 54	3 47.6	342 14	22 49.0	0.9670	1.3074	-2.68	0.4288 n
	11	0.0278	0.783	0.000	56 41	3 46.7	341 17	22 45.1	0.9674	1.3070	2.82	0.4502 n
	12	0.0305	0.793	-0.004	56 31	3 46.1	340 20	22 41.3	0.9685	1.3065	2.96	0.4707 n
	13	0.0332	0.803	0.008	56 23	3 45.5	339 23	22 37.5	0.9705	1.3061	3.09	0.4901 n
	14	0.0360	0.812	0.009	56 11	3 44.7	338 25	22 33.7	0.9730	1.3057	3.22	0.5084 n
	15	0.0387	+0.822	-0.007	55 55	3 43.6	337 28	22 29.8	0.9759	1.3052	-3.36	0.5260 n
	16	0.0414	0.832	-0.004	55 33	3 42.2	336 30	22 26.0	0.9788	1.3047	3.49	0.5426 n
	17	0.0442	0.841	+0.001	55 05	3 40.3	335 32	22 22.1	0.9812	1.3042	3.62	0.5585 n
	18	0.0469	0.851	0.006	54 35	3 38.3	334 34	22 18.3	0.9830	1.3037	3.75	0.5737 n
	19	0.0497	0.860	0.010	54 04	3 36.3	333 36	22 14.4	0.9842	1.3032	3.88	0.5883 n
h (8.0)	20	0.0524	+0.869	+0.012	53 35	3 34.3	332 38	22 10.5	0.9848	1.3027	-4.00	0.6023 n
	21	0.0551	0.878	0.012	53 08	3 32.5	331 40	22 06.6	0.9849	1.3021	4.13	0.6157 n
	22	0.0579	0.887	0.010	52 45	3 31.0	330 41	22 02.7	0.9846	1.3015	4.25	0.6285 n
	23	0.0606	0.896	0.007	52 27	3 29.8	329 43	21 58.8	0.9845	1.3010	4.37	0.6409 n
	24	0.0634	0.905	+0.003	52 12	3 28.8	328 44	21 54.9	0.9843	1.3004	4.50	0.6527 n
	25	0.0661	+0.914	-0.002	52 02	3 28.1	327 45	21 51.0	0.9844	1.2998	-4.61	0.6642 n
	26	0.0688	0.923	0.007	51 54	3 27.6	326 46	21 47.1	0.9850	1.2992	4.73	0.6752 n
	27	0.0716	0.932	0.011	51 46	3 27.1	325 47	21 43.1	0.9861	1.2986	4.85	0.6857 n
	28	0.0743	0.940	0.013	51 39	3 26.6	324 47	21 39.2	0.9877	1.2980	4.97	0.6959 n
	29	0.0770	0.948	0.014	51 28	3 25.9	323 48	21 35.2	0.9897	1.2973	5.08	0.7058 n
	30	0.0798	+0.957	-0.012	51 13	3 24.9	322 48	21 31.2	0.9920	1.2967	-5.19	0.7153 n
	31	0.0825	0.965	0.008	50 53	3 23.6	321 48	21 27.2	0.9944	1.2960	5.30	0.7244 n
Feb.	1	0.0853	0.973	-0.003	50 27	3 21.8	320 48	21 23.2	0.9966	1.2954	5.41	0.7332 n
	2	0.0880	0.981	+0.003	49 58	3 19.8	319 48	21 19.2	0.9981	1.2947	5.52	0.7417 n
	3	0.0907	0.989	0.007	49 27	3 17.8	318 48	21 15.2	0.9990	1.2941	5.62	0.7499 n
h (9.0)	4	0.0935	+0.997	+0.010	48 58	3 15.9	317 48	21 11.2	0.9992	1.2934	-5.73	0.7579 n
	5	0.0962	1.005	0.009	48 34	3 14.2	316 47	21 07.1	0.9988	1.2928	5.83	0.7654 n
	6	0.0989	1.012	0.007	48 16	3 13.1	315 46	21 03.1	0.9984	1.2921	5.93	0.7728 n
	7	0.1017	1.020	+0.002	48 05	3 12.3	314 45	20 59.0	0.9981	1.2914	6.02	0.7800 n
	8	0.1044	1.027	-0.003	47 59	3 11.9	313 44	20 54.9	0.9984	1.2908	6.12	0.7868 n
	9	0.1072	+1.035	-0.007	47 56	3 11.7	312 43	20 50.8	0.9995	1.2901	-6.21	0.7934 n
	10	0.1099	1.042	0.008	47 51	3 11.4	311 41	20 46.7	1.0012	1.2895	6.31	0.7998 n
	11	0.1126	1.049	0.007	47 43	3 10.9	310 40	20 42.6	1.0035	1.2888	6.40	0.8060 n
	12	0.1154	1.056	-0.004	47 31	3 10.0	309 38	20 38.5	1.0059	1.2882	6.48	0.8119 n
	13	0.1181	1.063	0.000	47 12	3 08.8	308 36	20 34.4	1.0082	1.2875	6.57	0.8176 n
	14	0.1208	+1.070	+0.005	46 50	3 07.3	307 34	20 30.2	1.0099	1.2869	-6.65	0.8231 n
	15	0.1236	+1.076	+0.009	46 26	3 05.8	306 31	20 26.1	1.0111	1.2862	-6.74	0.8284 n

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Date (Sid. Hr.)	τ	f		f'		G		H		Log g	Log h	i	Log i
		In Time		In Time		In Arc	In Time	In Arc	In Time				
	y	s		s		° '	h m	° '	h m			"	
Feb. 15	0.1236	+1.076		+0.009		46 26	3 05.8	306 31	20 26.1	1.0111	1.2862	-6.74	0.8284 n
16	0.1263	1.083		0.012		46 03	3 04.2	305 29	20 21.9	1.0117	1.2856	6.82	0.8335 n
17	0.1291	1.090		0.013		45 42	3 02.8	304 26	20 17.7	1.0118	1.2850	6.89	0.8384 n
18	0.1318	1.096		0.011		45 24	3 01.6	303 24	20 13.6	1.0114	1.2844	6.97	0.8432 n
19	0.1345	1.103		0.008		45 10	3 00.7	302 21	20 09.4	1.0111	1.2838	7.04	0.8477 n
h 20	0.1373	+1.109		+0.004		45 00	3 00.0	301 18	20 05.2	1.0107	1.2832	-7.11	0.8520 n
(10.0) 21	0.1400	1.115		0.000		44 53	2 59.6	300 14	20 01.0	1.0105	1.2826	7.18	0.8562 n
22	0.1428	1.121		-0.005		44 50	2 59.3	299 11	19 56.7	1.0105	1.2820	7.25	0.8602 n
23	0.1455	1.127		0.009		44 48	2 59.2	298 08	19 52.5	1.0110	1.2815	7.31	0.8640 n
24	0.1482	1.133		0.012		44 47	2 59.2	297 04	19 48.3	1.0121	1.2809	7.37	0.8676 n
25	0.1510	+1.139		-0.014		44 44	2 58.9	296 00	19 44.0	1.0135	1.2804	-7.43	0.8712 n
26	0.1537	1.145		0.013		44 39	2 58.6	294 57	19 39.8	1.0154	1.2799	7.49	0.8745 n
27	0.1564	1.151		0.010		44 29	2 57.9	293 53	19 35.5	1.0175	1.2794	7.55	0.8777 n
28	0.1592	1.156		-0.005		44 14	2 57.0	292 49	19 31.2	1.0195	1.2789	7.60	0.8807 n
Mar. 1	0.1619	1.162		0.000		43 56	2 55.7	291 44	19 27.0	1.0213	1.2785	7.65	0.8836 n
2	0.1647	+1.167		+0.005		43 34	2 54.2	290 40	19 22.7	1.0225	1.2780	-7.70	0.8863 n
3	0.1674	1.173		0.008		43 11	2 52.7	289 36	19 18.4	1.0230	1.2776	7.74	0.8889 n
4	0.1701	1.178		0.009		42 51	2 51.4	288 31	19 14.1	1.0229	1.2772	7.78	0.8913 n
5	0.1729	1.184		0.007		42 37	2 50.5	287 27	19 09.8	1.0226	1.2768	7.83	0.8935 n
6	0.1756	1.189		+0.003		42 29	2 49.9	286 22	19 05.5	1.0222	1.2765	7.86	0.8956 n
h 7	0.1783	+1.194		-0.002		42 26	2 49.7	285 17	19 01.2	1.0221	1.2761	-7.90	0.8976 n
(11.0) 8	0.1811	1.199		0.006		42 29	2 50.0	284 13	18 56.8	1.0229	1.2758	7.93	0.8994 n
9	0.1838	1.205		0.008		42 32	2 50.2	283 08	18 52.5	1.0242	1.2755	7.96	0.9011 n
10	0.1866	1.210		0.008		42 33	2 50.2	282 03	18 48.2	1.0263	1.2752	7.99	0.9027 n
11	0.1893	1.215		0.005		42 30	2 50.0	280 58	18 43.9	1.0287	1.2749	8.02	0.9041 n
12	0.1920	+1.220		-0.001		42 21	2 49.4	279 53	18 39.5	1.0312	1.2747	-8.04	0.9054 n
13	0.1948	1.225		+0.005		42 08	2 48.5	278 48	18 35.2	1.0333	1.2745	8.06	0.9065 n
14	0.1975	1.230		0.009		41 53	2 47.5	277 43	18 30.9	1.0350	1.2743	8.08	0.9075 n
15	0.2002	1.235		0.012		41 36	2 46.4	276 38	18 26.5	1.0359	1.2742	8.10	0.9084 n
16	0.2030	1.240		0.014		41 20	2 45.4	275 33	18 22.2	1.0363	1.2740	8.11	0.9091 n
17	0.2057	+1.245		+0.013		41 08	2 44.5	274 28	18 17.9	1.0363	1.2739	-8.12	0.9097 n
18	0.2085	1.250		0.010		40 59	2 43.9	273 23	18 13.5	1.0361	1.2738	8.13	0.9102 n
19	0.2112	1.255		0.006		40 54	2 43.6	272 18	18 09.2	1.0359	1.2738	8.14	0.9106 n
20	0.2139	1.259		+0.001		40 53	2 43.5	271 13	18 04.9	1.0358	1.2737	8.14	0.9108 n
21	0.2167	1.264		-0.003		40 54	2 43.6	270 08	18 00.5	1.0361	1.2737	8.14	0.9108 n
h 22	0.2194	+1.269		-0.008		40 58	2 43.9	269 03	17 56.2	1.0367	1.2737	-8.14	0.9108 n
(12.0) 23	0.2222	1.274		0.011		41 02	2 44.1	267 58	17 51.9	1.0379	1.2737	8.14	0.9106 n
24	0.2249	1.279		0.013		41 06	2 44.4	266 53	17 47.6	1.0392	1.2738	8.13	0.9103 n
25	0.2276	1.284		0.013		41 08	2 44.6	265 49	17 43.2	1.0412	1.2739	8.13	0.9099 n
26	0.2304	1.289		0.011		41 06	2 44.4	264 44	17 38.9	1.0433	1.2740	8.12	0.9093 n
27	0.2331	+1.294		-0.007		41 00	2 44.0	263 39	17 34.6	1.0456	1.2741	-8.10	0.9086 n
28	0.2358	1.299		-0.002		40 50	2 43.4	262 35	17 30.3	1.0477	1.2743	8.09	0.9078 n
29	0.2386	1.304		+0.002		40 36	2 42.4	261 30	17 26.0	1.0494	1.2745	8.07	0.9068 n
30	0.2413	1.309		0.006		40 20	2 41.4	260 26	17 21.7	1.0506	1.2746	8.05	0.9057 n
31	0.2441	1.314		0.008		40 06	2 40.4	259 22	17 17.4	1.0512	1.2749	8.03	0.9045 n
Apr. 1	0.2468	+1.319		+0.007		39 55	2 39.6	258 17	17 13.2	1.0514	1.2751	-8.00	0.9031 n
2	0.2495	+1.324		+0.003		39 49	2 39.3	257 13	17 08.9	1.0515	1.2754	-7.97	0.9016 n

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Date (Sid. Hr.)	τ	f	f'	G		H		Log g	Log h	i	Log i	
		In Time	In Time	In Arc	In Time	In Arc	In Time					
	y	s	s	°	'	°	'			"		
Apr.	1	0.2468	+1.319	+0.007	39 55	2 39.6	258 17	17 13.2	1.0514	1.2751	-8.00	0.9031 n
	2	0.2495	1.324	+0.003	39 49	2 39.3	257 13	17 08.9	1.0515	1.2754	7.97	0.9016 n
	3	0.2523	1.329	-0.001	39 50	2 39.3	256 09	17 04.6	1.0517	1.2757	7.94	0.9000 n
	4	0.2550	1.334	0.006	39 55	2 39.7	255 06	17 00.4	1.0525	1.2760	7.91	0.8983 n
	5	0.2577	1.339	0.009	40 02	2 40.1	254 02	16 56.1	1.0539	1.2763	7.88	0.8964 n
h (13.0)	6	0.2605	+1.345	-0.009	40 09	2 40.6	252 58	16 51.9	1.0562	1.2767	-7.84	0.8944 n
	7	0.2632	1.350	0.007	40 11	2 40.8	251 55	16 47.7	1.0589	1.2770	7.80	0.8922 n
	8	0.2660	1.355	-0.003	40 10	2 40.6	250 52	16 43.4	1.0618	1.2774	7.76	0.8899 n
	9	0.2687	1.361	+0.003	40 02	2 40.2	249 49	16 39.2	1.0645	1.2778	7.72	0.8874 n
	10	0.2714	1.366	0.008	39 52	2 39.5	248 46	16 35.0	1.0668	1.2783	7.67	0.8849 n
	11	0.2742	+1.372	+0.012	39 39	2 38.6	247 43	16 30.9	1.0685	1.2787	-7.62	0.8821 n
	12	0.2769	1.377	0.014	39 26	2 37.8	246 40	16 26.7	1.0696	1.2792	7.57	0.8793 n
	13	0.2796	1.383	0.014	39 17	2 37.1	245 38	16 22.5	1.0703	1.2796	7.52	0.8763 n
	14	0.2824	1.389	0.012	39 10	2 36.7	244 35	16 18.4	1.0707	1.2801	7.47	0.8731 n
	15	0.2851	1.394	0.008	39 08	2 36.5	243 33	16 14.2	1.0710	1.2806	7.41	0.8698 n
16	0.2879	+1.400	+0.003	39 08	2 36.6	242 31	16 10.1	1.0714	1.2811	-7.35	0.8663 n	
17	0.2906	1.406	-0.001	39 11	2 36.8	241 30	16 06.0	1.0721	1.2817	7.29	0.8627 n	
18	0.2933	1.412	0.006	39 17	2 37.1	240 28	16 01.9	1.0731	1.2822	7.23	0.8589 n	
19	0.2961	1.418	0.009	39 22	2 37.5	239 27	15 57.8	1.0746	1.2828	7.16	0.8550 n	
20	0.2988	1.424	0.011	39 28	2 37.9	238 26	15 53.7	1.0764	1.2833	7.09	0.8510 n	
h (14.0)	21	0.3016	+1.430	-0.012	39 32	2 38.2	237 25	15 49.6	1.0786	1.2839	-7.03	0.8466 n
	22	0.3043	1.436	0.010	39 33	2 38.2	236 24	15 45.6	1.0810	1.2845	6.95	0.8422 n
	23	0.3070	1.443	0.007	39 31	2 38.1	235 23	15 41.5	1.0836	1.2851	6.88	0.8377 n
	24	0.3098	1.449	-0.003	39 24	2 37.6	234 23	15 37.5	1.0862	1.2857	6.81	0.8328 n
	25	0.3125	1.456	+0.001	39 14	2 36.9	233 23	15 33.5	1.0884	1.2863	6.73	0.8279 n
	26	0.3152	+1.462	+0.005	39 02	2 36.1	232 23	15 29.5	1.0903	1.2869	-6.65	0.8228 n
	27	0.3180	1.469	0.007	38 50	2 35.3	231 23	15 25.5	1.0915	1.2875	6.57	0.8175 n
	28	0.3207	1.476	0.007	38 40	2 34.7	230 23	15 21.5	1.0924	1.2881	6.49	0.8120 n
	29	0.3235	1.483	+0.004	38 34	2 34.2	229 24	15 17.6	1.0930	1.2888	6.40	0.8063 n
	30	0.3262	1.490	0.000	38 32	2 34.2	228 25	15 13.6	1.0937	1.2894	6.32	0.8004 n
May	1	0.3289	+1.497	-0.005	38 35	2 34.4	227 26	15 09.7	1.0947	1.2900	-6.23	0.7943 n
	2	0.3317	1.504	0.009	38 41	2 34.7	226 27	15 05.8	1.0962	1.2907	6.14	0.7880 n
	3	0.3344	1.511	0.010	38 47	2 35.2	225 28	15 01.9	1.0985	1.2913	6.05	0.7815 n
	4	0.3371	1.518	0.009	38 52	2 35.5	224 30	14 58.0	1.1013	1.2919	5.95	0.7747 n
	5	0.3399	1.526	-0.006	38 51	2 35.4	223 32	14 54.1	1.1044	1.2926	5.86	0.7677 n
h (15.0)	6	0.3426	+1.533	0.000	38 46	2 35.1	222 34	14 50.2	1.1076	1.2932	-5.76	0.7605 n
	7	0.3454	1.540	+0.006	38 38	2 34.5	221 36	14 46.4	1.1104	1.2938	5.66	0.7530 n
	8	0.3481	1.548	0.011	38 25	2 33.7	220 38	14 42.6	1.1127	1.2945	5.56	0.7454 n
	9	0.3508	1.556	0.014	38 13	2 32.9	219 41	14 38.7	1.1145	1.2951	5.46	0.7374 n
	10	0.3536	1.564	0.015	38 01	2 32.1	218 44	14 34.9	1.1158	1.2957	5.36	0.7292 n
	11	0.3563	+1.572	+0.013	37 53	2 31.5	217 47	14 31.1	1.1167	1.2963	-5.26	0.7207 n
	12	0.3590	1.580	0.010	37 48	2 31.2	216 50	14 27.3	1.1174	1.2969	5.15	0.7118 n
	13	0.3618	1.587	+0.005	37 47	2 31.1	215 53	14 23.5	1.1182	1.2975	5.04	0.7027 n
	14	0.3645	1.596	0.000	37 47	2 31.1	214 57	14 19.8	1.1192	1.2981	4.93	0.6933 n
	15	0.3673	1.604	-0.005	37 50	2 31.3	214 00	14 16.0	1.1204	1.2987	4.83	0.6835 n
	16	0.3700	+1.612	-0.008	37 53	2 31.6	213 04	14 12.3	1.1220	1.2993	-4.71	0.6734 n
	17	0.3727	+1.621	-0.011	37 57	2 31.8	212 08	14 08.6	1.1240	1.2999	-4.60	0.6629 n

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Date (Sid. Hr.)	τ	f		f'		G		H		Log g	Log h	i	Log i
		In Time	In Time	In Time	In Time	In Arc	In Time	In Arc	In Time				
		y	s	s	'	°	'	°	'				
May 17	0.3727	+1.621	-0.011	37 57	2 31.8	212 08	14 08.6	1.1240	1.2999	-4.60	0.6629 n		
18	0.3755	1.629	0.011	37 57	2 31.8	211 13	14 04.8	1.1262	1.3004	4.49	0.6521 n		
19	0.3782	1.638	0.010	37 59	2 31.9	210 17	14 01.1	1.1288	1.3010	4.37	0.6409 n		
20	0.3810	1.646	0.007	37 55	2 31.7	209 22	13 57.4	1.1315	1.3015	4.26	0.6291 n		
21	0.3837	1.655	-0.004	37 48	2 31.2	208 26	13 53.7	1.1341	1.3020	4.14	0.6170 n		
h 22	0.3864	+1.664	+0.001	37 38	2 30.6	207 31	13 50.1	1.1366	1.3026	-4.02	0.6044 n		
(16.0) 23	0.3892	1.672	0.005	37 26	2 29.7	206 36	13 46.4	1.1387	1.3031	3.90	0.5913 n		
24	0.3919	1.681	0.007	37 12	2 28.8	205 41	13 42.7	1.1403	1.3036	3.78	0.5777 n		
25	0.3946	1.690	0.008	37 00	2 28.0	204 47	13 39.1	1.1416	1.3041	3.66	0.5636 n		
26	0.3974	1.699	0.005	36 51	2 27.4	203 52	13 35.5	1.1425	1.3045	3.54	0.5488 n		
27	0.4001	+1.708	+0.001	36 46	2 27.1	202 58	13 31.8	1.1433	1.3050	-3.41	0.5333 n		
28	0.4029	1.717	-0.003	36 45	2 27.0	202 03	13 28.2	1.1443	1.3054	3.29	0.5172 n		
29	0.4056	1.727	0.008	36 47	2 27.1	201 09	13 24.6	1.1457	1.3059	3.17	0.5004 n		
30	0.4083	1.736	0.011	36 50	2 27.3	200 15	13 21.0	1.1476	1.3063	3.04	0.4827 n		
31	0.4111	1.745	0.011	36 52	2 27.5	199 21	13 17.4	1.1502	1.3067	2.91	0.4642 n		
June 1	0.4138	+1.755	-0.008	36 51	2 27.4	198 27	13 13.8	1.1530	1.3071	-2.78	0.4447 n		
2	0.4165	1.764	-0.003	36 45	2 27.0	197 34	13 10.3	1.1561	1.3074	2.66	0.4242 n		
3	0.4193	1.774	+0.002	36 36	2 26.4	196 40	13 06.7	1.1588	1.3078	2.53	0.4024 n		
4	0.4220	1.783	0.008	36 24	2 25.6	195 47	13 03.1	1.1614	1.3081	2.40	0.3795 n		
5	0.4248	1.793	0.012	36 09	2 24.6	194 53	12 59.6	1.1634	1.3084	2.27	0.3553 n		
h 6	0.4275	+1.802	+0.014	35 55	2 23.7	194 00	12 56.0	1.1648	1.3087	-2.14	0.3294 n		
(17.0) 7	0.4302	1.812	0.014	35 43	2 22.9	193 07	12 52.5	1.1660	1.3090	2.00	0.3019 n		
8	0.4330	1.822	0.011	35 34	2 22.3	192 14	12 48.9	1.1668	1.3093	1.87	0.2723 n		
9	0.4357	1.832	0.007	35 28	2 21.8	191 21	12 45.4	1.1676	1.3095	1.74	0.2403 n		
10	0.4384	1.841	+0.002	35 25	2 21.6	190 28	12 41.8	1.1684	1.3098	1.61	0.2057 n		
11	0.4412	+1.851	-0.003	35 24	2 21.6	189 35	12 38.3	1.1694	1.3100	-1.47	0.1682 n		
12	0.4439	1.861	0.007	35 24	2 21.6	188 42	12 34.8	1.1708	1.3102	1.34	0.1268 n		
13	0.4467	1.871	0.010	35 24	2 21.6	187 49	12 31.3	1.1724	1.3104	1.20	0.0810 n		
14	0.4494	1.881	0.011	35 23	2 21.6	186 56	12 27.7	1.1744	1.3105	1.07	0.0298 n		
15	0.4521	1.891	0.011	35 21	2 21.4	186 04	12 24.2	1.1767	1.3107	0.94	9.9713 n		
16	0.4549	+1.901	-0.008	35 16	2 21.1	185 11	12 20.7	1.1791	1.3108	-0.80	9.9036 n		
17	0.4576	1.910	-0.004	35 08	2 20.6	184 18	12 17.2	1.1816	1.3109	0.67	9.8235 n		
18	0.4603	1.920	0.000	34 57	2 19.8	183 26	12 13.7	1.1840	1.3110	0.53	9.7251 n		
19	0.4631	1.930	+0.005	34 44	2 18.9	182 33	12 10.2	1.1859	1.3110	0.39	9.5966 n		
20	0.4658	1.940	0.008	34 29	2 17.9	181 41	12 06.7	1.1875	1.3111	0.26	9.4150 n		
h 21	0.4686	+1.950	+0.009	34 14	2 16.9	180 48	12 03.2	1.1886	1.3111	-0.12	9.0934 n		
(18.0) 22	0.4713	1.960	0.007	34 02	2 16.1	179 55	11 59.7	1.1895	1.3111	+0.01	8.0792		
23	0.4740	1.970	+0.004	33 53	2 15.6	179 03	11 56.2	1.1902	1.3111	0.15	9.1673		
24	0.4768	1.980	-0.001	33 48	2 15.2	178 10	11 52.7	1.1908	1.3111	0.28	9.4518		
25	0.4795	1.990	0.006	33 46	2 15.1	177 18	11 49.2	1.1919	1.3110	0.42	9.6212		
26	0.4823	+2.000	-0.009	33 46	2 15.1	176 25	11 45.7	1.1934	1.3110	+0.55	9.7435		
27	0.4850	2.010	0.011	33 46	2 15.1	175 33	11 42.2	1.1952	1.3109	0.69	9.8382		
28	0.4877	2.020	0.009	33 44	2 14.9	174 40	11 38.7	1.1975	1.3108	0.82	9.9159		
29	0.4905	2.030	-0.005	33 38	2 14.6	173 48	11 35.2	1.2000	1.3106	0.96	9.9818		
30	0.4932	2.040	0.000	33 29	2 13.9	172 55	11 31.7	1.2024	1.3105	1.09	0.0386		
July 1	0.4959	+2.050	+0.005	33 17	2 13.1	172 02	11 28.2	1.2047	1.3103	+1.23	0.0888		
2	0.4987	+2.059	+0.010	33 02	2 12.1	171 10	11 24.6	1.2065	1.3102	+1.36	0.1339		

INDEPENDENT STAR NUMBERS, 1958

FOR 0^h UNIVERSAL TIME

Date (Sid. Hr.)	τ	f		f'		G		H		Log g	Log h	i	Log i
		In Time		In Time		In Arc	In Time	In Arc	In Time				
		γ	δ	δ		$\circ$ $'$	h m	$\circ$ $'$	h m			$''$	
July	1	0.4959	+2.050	+0.005		33 17	2 13.1	172 02	11 28.2	1.2047	1.3103	+1.23	0.0888
	2	0.4987	2.059	0.010		33 02	2 12.1	171 10	11 24.6	1.2065	1.3102	1.36	0.1339
	3	0.5014	2.069	0.013		32 47	2 11.1	170 17	11 21.1	1.2079	1.3100	1.49	0.1744
	4	0.5042	2.079	0.013		32 33	2 10.2	169 24	11 17.6	1.2089	1.3097	1.63	0.2114
	5	0.5069	2.089	0.011		32 21	2 09.4	168 31	11 14.1	1.2096	1.3095	1.76	0.2455
	6	0.5096	+2.098	+0.008		32 13	2 08.8	167 38	11 10.6	1.2102	1.3093	+1.89	0.2769
	h 7	0.5124	2.108	+0.003		32 06	2 08.4	166 45	11 07.0	1.2107	1.3090	2.02	0.3060
	(19.0) 8	0.5151	2.118	-0.002		32 02	2 08.1	165 52	11 03.5	1.2113	1.3087	2.15	0.3332
	9	0.5178	2.128	0.006		31 59	2 07.9	164 59	10 59.9	1.2123	1.3084	2.29	0.3589
	10	0.5206	2.137	0.010		31 57	2 07.8	164 06	10 56.4	1.2132	1.3081	2.42	0.3829
	11	0.5233	+2.147	-0.012		31 56	2 07.8	163 13	10 52.9	1.2147	1.3077	+2.54	0.4055
	12	0.5261	2.156	0.012		31 53	2 07.5	162 20	10 49.3	1.2163	1.3074	2.67	0.4268
	13	0.5288	2.165	0.010		31 48	2 07.2	161 26	10 45.7	1.2183	1.3070	2.80	0.4472
	14	0.5315	2.175	0.006		31 41	2 06.7	160 33	10 42.2	1.2203	1.3066	2.93	0.4664
	15	0.5343	2.184	-0.001		31 30	2 06.0	159 39	10 38.6	1.2222	1.3062	3.05	0.4847
	16	0.5370	+2.193	+0.003		31 17	2 05.1	158 45	10 35.0	1.2240	1.3058	+3.18	0.5022
	17	0.5397	2.202	0.007		31 02	2 04.1	157 51	10 31.4	1.2254	1.3054	3.30	0.5188
	18	0.5425	2.211	0.009		30 47	2 03.1	156 57	10 27.8	1.2264	1.3050	3.43	0.5348
	19	0.5452	2.220	0.008		30 33	2 02.2	156 03	10 24.2	1.2269	1.3045	3.55	0.5501
	20	0.5480	2.229	0.006		30 22	2 01.5	155 09	10 20.6	1.2274	1.3040	3.67	0.5647
	21	0.5507	+2.238	+0.001		30 15	2 01.0	154 15	10 17.0	1.2278	1.3035	+3.79	0.5788
	h 22	0.5534	2.247	-0.004		30 11	2 00.8	153 20	10 13.3	1.2283	1.3030	3.91	0.5922
	(20.0) 23	0.5562	2.256	0.008		30 10	2 00.7	152 26	10 09.7	1.2291	1.3025	4.03	0.6052
	24	0.5589	2.264	0.010		30 10	2 00.6	151 31	10 06.1	1.2303	1.3020	4.15	0.6176
	25	0.5617	2.273	0.009		30 07	2 00.3	150 36	10 02.4	1.2320	1.3015	4.26	0.6297
	26	0.5644	+2.282	-0.006		30 04	2 00.2	149 41	9 58.7	1.2338	1.3010	+4.38	0.6413
	27	0.5671	2.290	-0.001		29 56	1 59.7	148 46	9 55.0	1.2358	1.3004	4.49	0.6523
	28	0.5699	2.298	+0.004		29 45	1 59.0	147 50	9 51.4	1.2376	1.2998	4.60	0.6631
	29	0.5726	2.307	0.009		29 32	1 58.1	146 55	9 47.7	1.2391	1.2993	4.72	0.6736
	30	0.5753	2.315	0.012		29 18	1 57.2	145 59	9 43.9	1.2403	1.2987	4.83	0.6836
Aug.	31	0.5781	+2.323	+0.013		29 05	1 56.3	145 03	9 40.2	1.2411	1.2981	+4.93	0.6933
	1	0.5808	2.331	0.012		28 53	1 55.5	144 07	9 36.5	1.2415	1.2975	5.04	0.7026
	2	0.5836	2.339	0.009		28 44	1 54.9	143 11	9 32.8	1.2418	1.2969	5.15	0.7116
	3	0.5863	2.347	+0.005		28 36	1 54.4	142 15	9 29.0	1.2419	1.2963	5.25	0.7204
	4	0.5890	2.355	0.000		28 31	1 54.1	141 18	9 25.2	1.2422	1.2957	5.36	0.7288
	5	0.5918	+2.363	-0.005		28 28	1 53.9	140 22	9 21.5	1.2425	1.2951	+5.46	0.7370
	h 6	0.5945	2.370	0.009		28 26	1 53.8	139 25	9 17.7	1.2431	1.2945	5.56	0.7449
	(21.0) 7	0.5972	2.378	0.011		28 25	1 53.7	138 28	9 13.9	1.2440	1.2939	5.66	0.7526
	8	0.6000	2.385	0.012		28 24	1 53.6	137 31	9 10.0	1.2451	1.2932	5.75	0.7600
	9	0.6027	2.393	0.011		28 21	1 53.4	136 33	9 06.2	1.2464	1.2926	5.85	0.7671
	10	0.6055	+2.400	-0.008		28 16	1 53.1	135 36	9 02.4	1.2479	1.2920	+5.94	0.7740
	11	0.6082	2.407	-0.004		28 08	1 52.5	134 38	8 58.5	1.2495	1.2914	6.04	0.7807
	12	0.6109	2.414	+0.001		27 57	1 51.8	133 40	8 54.7	1.2509	1.2907	6.13	0.7872
	13	0.6137	2.421	0.005		27 45	1 51.0	132 42	8 50.8	1.2521	1.2901	6.22	0.7934
	14	0.6164	2.428	0.008		27 31	1 50.1	131 44	8 46.9	1.2530	1.2895	6.30	0.7995
	15	0.6191	+2.435	+0.009		27 18	1 49.2	130 45	8 43.0	1.2534	1.2889	+6.39	0.8054
	16	0.6219	+2.442	+0.007		27 08	1 48.5	129 46	8 39.1	1.2537	1.2882	+6.47	0.8111

FOR 0^h UNIVERSAL TIME

Date (Sid. Hr.)	τ	f	f'	G		H		Log g	Log h	i	Log i
		In Time	In Time	In Arc	In Time	In Arc	In Time				
	y	s	s	° ' "	h m	° ' "	h m			"	
Aug. 16	0.6219	+2.442	+0.007	27 08	1 48.5	129 46	8 39.1	1.2537	1.2882	+6.47	0.8111
17	0.6246	2.449	+0.003	27 01	1 48.0	128 48	8 35.2	1.2537	1.2876	6.55	0.8165
18	0.6274	2.455	-0.002	26 57	1 47.8	127 49	8 31.2	1.2538	1.2870	6.63	0.8218
19	0.6301	2.462	0.006	26 56	1 47.7	126 49	8 27.3	1.2541	1.2864	6.71	0.8270
20	0.6328	2.468	0.009	26 57	1 47.8	125 50	8 23.3	1.2549	1.2858	6.79	0.8318
h 21	0.6356	+2.475	-0.009	26 58	1 47.9	124 50	8 19.4	1.2560	1.2852	+6.86	0.8366
(22.0) 22	0.6383	2.481	0.006	26 56	1 47.8	123 50	8 15.4	1.2575	1.2846	6.94	0.8412
23	0.6411	2.487	-0.002	26 52	1 47.5	122 50	8 11.4	1.2591	1.2841	7.01	0.8455
24	0.6438	2.493	+0.003	26 45	1 47.0	121 50	8 07.3	1.2606	1.2835	7.08	0.8498
25	0.6465	2.499	0.008	26 35	1 46.4	120 50	8 03.3	1.2619	1.2829	7.14	0.8539
26	0.6493	+2.505	+0.012	26 24	1 45.6	119 49	7 59.3	1.2628	1.2824	+7.21	0.8579
27	0.6520	2.511	0.013	26 13	1 44.9	118 49	7 55.2	1.2634	1.2818	7.27	0.8616
28	0.6547	2.517	0.012	26 03	1 44.2	117 48	7 51.2	1.2637	1.2813	7.33	0.8652
29	0.6575	2.523	0.010	25 56	1 43.7	116 47	7 47.1	1.2638	1.2808	7.39	0.8687
30	0.6602	2.529	0.006	25 50	1 43.3	115 45	7 43.0	1.2637	1.2803	7.45	0.8720
31	0.6630	+2.534	+0.001	25 47	1 43.1	114 44	7 38.9	1.2637	1.2798	+7.50	0.8752
Sept. 1	0.6657	2.540	-0.003	25 45	1 43.0	113 42	7 34.8	1.2638	1.2793	7.55	0.8782
2	0.6684	2.545	0.007	25 45	1 43.0	112 41	7 30.7	1.2640	1.2789	7.60	0.8810
3	0.6712	2.551	0.010	25 46	1 43.1	111 39	7 26.6	1.2645	1.2784	7.65	0.8838
4	0.6739	2.556	0.012	25 47	1 43.2	110 37	7 22.4	1.2653	1.2780	7.70	0.8864
h 5	0.6766	+2.562	-0.012	25 48	1 43.2	109 34	7 18.3	1.2662	1.2776	+7.74	0.8889
(23.0) 6	0.6794	2.567	0.010	25 47	1 43.1	108 32	7 14.1	1.2674	1.2772	7.78	0.8912
7	0.6821	2.572	0.006	25 44	1 42.9	107 30	7 10.0	1.2687	1.2768	7.82	0.8934
8	0.6849	2.577	-0.002	25 37	1 42.5	106 27	7 05.8	1.2700	1.2765	7.86	0.8954
9	0.6876	2.583	+0.003	25 29	1 41.9	105 24	7 01.6	1.2711	1.2761	7.90	0.8974
10	0.6903	+2.588	+0.006	25 19	1 41.3	104 21	6 57.4	1.2719	1.2758	+7.93	0.8992
11	0.6931	2.593	0.008	25 09	1 40.6	103 18	6 53.2	1.2724	1.2755	7.96	0.9009
12	0.6958	2.598	0.007	25 01	1 40.1	102 15	6 49.0	1.2726	1.2753	7.99	0.9024
13	0.6985	2.603	+0.004	24 55	1 39.6	101 12	6 44.8	1.2726	1.2750	8.01	0.9038
14	0.7013	2.608	-0.001	24 53	1 39.5	100 09	6 40.6	1.2725	1.2748	8.04	0.9050
15	0.7040	+2.613	-0.005	24 54	1 39.6	99 05	6 36.4	1.2726	1.2746	+8.06	0.9062
16	0.7068	2.618	0.009	24 57	1 39.8	98 02	6 32.1	1.2732	1.2744	8.08	0.9072
17	0.7095	2.623	0.009	25 01	1 40.1	96 58	6 27.9	1.2741	1.2742	8.09	0.9081
18	0.7122	2.627	0.007	25 04	1 40.2	95 54	6 23.6	1.2754	1.2741	8.11	0.9089
19	0.7150	2.632	-0.003	25 04	1 40.3	94 51	6 19.4	1.2769	1.2739	8.12	0.9096
20	0.7177	+2.637	+0.002	25 01	1 40.1	93 47	6 15.1	1.2784	1.2738	+8.13	0.9100
h 21	0.7205	2.642	0.008	24 56	1 39.7	92 43	6 10.9	1.2798	1.2738	8.14	0.9105
(0.0) 22	0.7232	2.647	0.012	24 48	1 39.2	91 39	6 06.6	1.2808	1.2737	8.14	0.9107
23	0.7259	2.651	0.014	24 41	1 38.7	90 35	6 02.3	1.2815	1.2737	8.14	0.9108
24	0.7287	2.656	0.014	24 34	1 38.2	89 31	5 58.1	1.2819	1.2737	8.14	0.9108
25	0.7314	+2.661	+0.011	24 29	1 37.9	88 27	5 53.8	1.2819	1.2737	+8.14	0.9107
26	0.7341	2.666	0.008	24 25	1 37.7	87 23	5 49.5	1.2819	1.2738	8.14	0.9105
27	0.7369	2.671	+0.003	24 25	1 37.7	86 19	5 45.2	1.2819	1.2738	8.13	0.9101
28	0.7396	2.675	-0.002	24 26	1 37.7	85 15	5 41.0	1.2821	1.2739	8.12	0.9096
29	0.7424	2.680	0.006	24 29	1 37.9	84 10	5 36.7	1.2823	1.2740	8.11	0.9089
30	0.7451	+2.685	-0.009	24 33	1 38.2	83 06	5 32.4	1.2828	1.2742	+8.09	0.9082
Oct. 1	0.7478	+2.690	-0.011	24 37	1 38.4	82 02	5 28.1	1.2835	1.2744	+8.08	0.9073

Date (Sid. Hr.)	τ	f		f'		G		H		Log g	Log h	i	Log i
		In Time		In Time		In Arc	In Time	In Arc	In Time				
		y	s	s	$^{\circ}$ $'$	h m	$^{\circ}$ $'$	h m				$''$	
Oct.	1	0.7478	+2.690	-0.011	24 37	1 38.4	82 02	5 28.1	1.2835	1.2744	+8.08	0.9073	
	2	0.7506	2.695	0.011	24 40	1 38.7	80 58	5 23.9	1.2841	1.2745	8.06	0.9063	
	3	0.7533	2.700	0.010	24 42	1 38.8	79 54	5 19.6	1.2856	1.2748	8.04	0.9051	
	4	0.7560	2.705	0.007	24 43	1 38.9	78 50	5 15.3	1.2869	1.2750	8.01	0.9038	
	5	0.7588	2.710	-0.003	24 41	1 38.8	77 46	5 11.1	1.2882	1.2752	7.99	0.9024	
h (1.0)	6	0.7615	+2.715	+0.001	24 37	1 38.5	76 42	5 06.8	1.2895	1.2755	+7.96	0.9010	
	7	0.7643	2.720	0.005	24 31	1 38.1	75 38	5 02.5	1.2905	1.2758	7.93	0.8992	
	8	0.7670	2.725	0.007	24 25	1 37.6	74 34	4 58.3	1.2913	1.2761	7.90	0.8974	
	9	0.7697	2.730	0.006	24 19	1 37.3	73 30	4 54.0	1.2918	1.2765	7.86	0.8954	
	10	0.7725	2.735	+0.004	24 15	1 37.0	72 27	4 49.8	1.2919	1.2769	7.82	0.8933	
	11	0.7752	+2.740	0.000	24 14	1 36.9	71 23	4 45.5	1.2920	1.2772	+7.78	0.8910	
	12	0.7779	2.746	-0.005	24 16	1 37.0	70 19	4 41.3	1.2923	1.2776	7.74	0.8886	
	13	0.7807	2.751	0.009	24 21	1 37.4	69 16	4 37.1	1.2928	1.2781	7.69	0.8862	
	14	0.7834	2.757	0.010	24 29	1 37.9	68 13	4 32.8	1.2937	1.2785	7.65	0.8834	
	15	0.7862	2.762	0.009	24 33	1 38.2	67 09	4 28.6	1.2952	1.2789	7.60	0.8806	
h (2.0)	16	0.7889	+2.768	-0.006	24 37	1 38.5	66 06	4 24.4	1.2968	1.2794	+7.54	0.8777	
	17	0.7916	2.773	0.000	24 38	1 38.5	65 03	4 20.2	1.2986	1.2799	7.49	0.8745	
	18	0.7944	2.779	+0.006	24 35	1 38.3	64 00	4 16.0	1.3002	1.2804	7.43	0.8712	
	19	0.7971	2.785	0.011	24 31	1 38.0	62 57	4 11.8	1.3017	1.2809	7.37	0.8678	
	20	0.7999	2.790	0.014	24 25	1 37.7	61 54	4 07.6	1.3027	1.2815	7.31	0.8642	
	21	0.8026	+2.796	+0.015	24 20	1 37.3	60 51	4 03.4	1.3034	1.2820	+7.25	0.8603	
	22	0.8053	2.802	0.013	24 16	1 37.0	59 49	3 59.3	1.3039	1.2826	7.19	0.8564	
	23	0.8081	2.808	0.010	24 14	1 36.9	58 47	3 55.1	1.3042	1.2831	7.12	0.8524	
	24	0.8108	2.814	+0.005	24 15	1 37.0	57 44	3 50.9	1.3045	1.2837	7.05	0.8480	
	25	0.8135	2.821	0.000	24 18	1 37.2	56 42	3 46.8	1.3048	1.2843	6.98	0.8435	
	26	0.8163	+2.827	-0.004	24 21	1 37.4	55 40	3 42.7	1.3053	1.2849	+6.90	0.8389	
	27	0.8190	2.833	0.008	24 26	1 37.8	54 38	3 38.5	1.3061	1.2855	6.82	0.8341	
	28	0.8218	2.840	0.010	24 31	1 38.1	53 37	3 34.4	1.3070	1.2862	6.75	0.8291	
	29	0.8245	2.846	0.011	24 36	1 38.4	52 35	3 30.3	1.3082	1.2868	6.67	0.8239	
	30	0.8272	2.853	0.010	24 39	1 38.6	51 34	3 26.2	1.3096	1.2874	6.58	0.8185	
Nov.	31	0.8300	+2.860	-0.007	24 42	1 38.8	50 32	3 22.1	1.3110	1.2881	+6.50	0.8128	
	1	0.8327	2.867	-0.004	24 42	1 38.8	49 31	3 18.1	1.3126	1.2887	6.41	0.8070	
	2	0.8354	2.874	0.000	24 40	1 38.6	48 30	3 14.0	1.3142	1.2893	6.32	0.8009	
	3	0.8382	2.881	+0.004	24 36	1 38.4	47 29	3 09.9	1.3156	1.2900	6.23	0.7947	
	4	0.8409	2.888	0.006	24 31	1 38.0	46 29	3 05.9	1.3167	1.2906	6.14	0.7882	
h (3.0)	5	0.8437	+2.895	+0.006	24 25	1 37.7	45 28	3 01.9	1.3175	1.2913	+6.05	0.7814	
	6	0.8464	2.902	0.004	24 21	1 37.4	44 28	2 57.8	1.3181	1.2920	5.95	0.7744	
	7	0.8491	2.910	+0.001	24 20	1 37.4	43 27	2 53.8	1.3186	1.2926	5.85	0.7672	
	8	0.8519	2.917	-0.004	24 22	1 37.4	42 27	2 49.8	1.3190	1.2933	5.75	0.7597	
	9	0.8546	2.925	0.008	24 25	1 37.7	41 27	2 45.8	1.3198	1.2939	5.65	0.7520	
	10	0.8573	+2.933	-0.011	24 31	1 38.1	40 28	2 41.8	1.3208	1.2946	+5.55	0.7439	
	11	0.8601	2.940	0.011	24 37	1 38.4	39 28	2 37.9	1.3223	1.2952	5.44	0.7355	
	12	0.8628	2.948	0.008	24 41	1 38.7	38 28	2 33.9	1.3241	1.2959	5.33	0.7269	
	13	0.8656	2.956	-0.003	24 42	1 38.8	37 29	2 29.9	1.3262	1.2965	5.22	0.7180	
	14	0.8683	2.964	+0.003	24 41	1 38.7	36 30	2 26.0	1.3282	1.2971	5.11	0.7087	
	15	0.8710	+2.973	+0.009	24 37	1 38.4	35 31	2 22.1	1.3300	1.2978	+5.00	0.6990	
	16	0.8738	+2.981	+0.013	24 31	1 38.0	34 32	2 18.1	1.3315	1.2984	+4.89	0.6890	

FOR 0^h UNIVERSAL TIME

Date (Sid. Hr.)	τ	f	f'	G		H		Log g	Log h	i	Log i
		In Time	In Time	In Arc	In Time	In Arc	In Time				
	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$	$^{\circ}$			$''$	
Nov. 16	0.8738	+2.981	+0.013	24 31	1 38.0	34 32	2 18.1	1.3315	1.2984	+4.89	0.6890
17	0.8765	2.989	0.015	24 25	1 37.7	33 33	2 14.2	1.3326	1.2990	4.77	0.6786
18	0.8792	2.998	0.015	24 19	1 37.3	32 35	2 10.3	1.3335	1.2996	4.65	0.6679
19	0.8820	3.006	0.012	24 17	1 37.1	31 36	2 06.4	1.3342	1.3002	4.54	0.6568
20	0.8847	3.015	0.007	24 16	1 37.0	30 38	2 02.5	1.3347	1.3008	4.42	0.6451
$^{\circ}$ 21	0.8875	+3.024	+0.002	24 16	1 37.1	29 40	1 58.6	1.3353	1.3013	+4.30	0.6330
(4.0) 22	0.8902	3.033	-0.003	24 19	1 37.3	28 42	1 54.8	1.3360	1.3019	4.17	0.6203
23	0.8929	3.042	0.007	24 22	1 37.5	27 44	1 50.9	1.3369	1.3025	4.05	0.6072
24	0.8957	3.051	0.009	24 26	1 37.7	26 46	1 47.0	1.3381	1.3030	3.92	0.5936
25	0.8984	3.060	0.010	24 29	1 37.9	25 48	1 43.2	1.3394	1.3035	3.80	0.5794
26	0.9012	+3.069	-0.009	24 31	1 38.0	24 50	1 39.4	1.3409	1.3040	+3.67	0.5645
27	0.9039	3.078	0.007	24 31	1 38.1	23 53	1 35.5	1.3426	1.3045	3.54	0.5490
28	0.9066	3.088	-0.004	24 31	1 38.1	22 55	1 31.7	1.3443	1.3050	3.41	0.5326
29	0.9094	3.097	0.000	24 27	1 37.8	21 58	1 27.9	1.3460	1.3055	3.28	0.5156
30	0.9121	3.107	+0.003	24 22	1 37.5	21 01	1 24.1	1.3476	1.3059	3.15	0.4978
Dec. 1	0.9148	+3.116	+0.006	24 16	1 37.1	20 04	1 20.3	1.3489	1.3064	+3.01	0.4789
2	0.9176	3.126	0.007	24 10	1 36.7	19 07	1 16.5	1.3500	1.3068	2.88	0.4591
3	0.9203	3.136	0.006	24 04	1 36.3	18 10	1 12.7	1.3508	1.3072	2.74	0.4382
4	0.9231	3.146	+0.002	24 00	1 36.0	17 13	1 08.9	1.3515	1.3076	2.61	0.4161
5	0.9258	3.155	-0.002	23 59	1 35.9	16 17	1 05.1	1.3521	1.3079	2.47	0.3927
$^{\circ}$ 6	0.9285	+3.165	-0.007	23 59	1 36.0	15 20	1 01.3	1.3529	1.3083	+2.33	0.3677
(5.0) 7	0.9313	3.175	0.011	24 02	1 36.1	14 23	0 57.6	1.3539	1.3086	2.19	0.3410
8	0.9340	3.185	0.012	24 05	1 36.4	13 27	0 53.8	1.3553	1.3089	2.05	0.3126
9	0.9367	3.195	0.011	24 07	1 36.5	12 30	0 50.0	1.3570	1.3092	1.91	0.2819
10	0.9395	3.206	0.006	24 08	1 36.5	11 34	0 46.3	1.3590	1.3095	1.77	0.2487
11	0.9422	+3.216	-0.001	24 05	1 36.3	10 38	0 42.5	1.3610	1.3097	+1.63	0.2127
12	0.9450	3.226	+0.006	24 00	1 36.0	9 41	0 38.8	1.3629	1.3100	1.49	0.1732
13	0.9477	3.236	0.011	23 53	1 35.5	8 45	0 35.0	1.3646	1.3102	1.35	0.1297
14	0.9504	3.247	0.014	23 45	1 35.0	7 49	0 31.3	1.3659	1.3104	1.21	0.0810
15	0.9532	3.257	0.015	23 37	1 34.4	6 53	0 27.5	1.3669	1.3105	1.06	0.0261
16	0.9559	+3.267	+0.013	23 30	1 34.0	5 57	0 23.8	1.3677	1.3107	+0.92	9.9628
17	0.9586	3.277	0.009	23 26	1 33.7	5 01	0 20.0	1.3683	1.3108	0.77	9.8887
18	0.9614	3.288	+0.004	23 23	1 33.6	4 04	0 16.3	1.3689	1.3109	0.63	9.7993
19	0.9641	3.298	-0.001	23 23	1 33.5	3 08	0 12.6	1.3696	1.3110	0.49	9.6866
20	0.9669	3.309	0.005	23 23	1 33.6	2 12	0 08.8	1.3704	1.3111	0.34	9.5328
$^{\circ}$ 21	0.9696	+3.319	-0.008	23 24	1 33.6	1 16	0 05.1	1.3714	1.3111	+0.20	9.2945
(6.0) 22	0.9723	3.330	0.010	23 25	1 33.7	0 20	0 01.3	1.3727	1.3111	+0.05	8.7160
23	0.9751	3.340	0.010	23 25	1 33.7	359 24	23 57.6	1.3740	1.3111	-0.09	8.9685 n
24	0.9778	3.351	0.008	23 24	1 33.6	358 28	23 53.9	1.3756	1.3111	0.24	9.3766 n
25	0.9806	3.361	0.005	23 20	1 33.3	357 32	23 50.1	1.3771	1.3110	0.38	9.5832 n
26	0.9833	+3.371	-0.001	23 16	1 33.0	356 36	23 46.4	1.3787	1.3110	-0.53	9.7218 n
27	0.9860	3.382	+0.003	23 08	1 32.6	355 40	23 42.6	1.3802	1.3109	0.67	9.8274 n
28	0.9888	3.392	0.006	23 01	1 32.1	354 43	23 38.9	1.3815	1.3108	0.82	9.9112 n
29	0.9915	3.402	0.008	22 53	1 31.5	353 47	23 35.1	1.3825	1.3106	0.96	9.9818 n
30	0.9942	3.413	0.007	22 45	1 31.0	352 51	23 31.4	1.3834	1.3105	1.10	0.0426 n
31	0.9970	+3.423	+0.004	22 38	1 30.5	351 55	23 27.6	1.3840	1.3103	-1.25	0.0955 n
32	0.9997	+3.433	0.000	22 33	1 30.2	350 58	23 23.9	1.3845	1.3101	-1.39	0.1430 n

FOR GREENWICH SIDEREAL TWELVE HOURS

U. T.	Log <i>A</i> ₁	Log <i>B</i> ₁	Log <i>C</i>	Log <i>D</i>	<i>f</i>	<i>G</i> ₁	<i>H</i>	Log <i>g</i> ₁	Log <i>h</i>	Log <i>i</i>
					^s	[°] [']	[°] [']			
Jan. 1.22	9.3459	0.8964	0.5261 _n	1.3041	+0.683	60 34	350 32	0.9564	1.3100	0.1632 _n
11.19	9.4062	0.8936	0.8173 _n	1.2828	0.785	56 53	341 06	0.9706	1.3069	0.4544 _n
21.17	9.4559	0.8880	0.9807 _n	1.2458	0.880	53 27	331 30	0.9830	1.3020	0.6178 _n
31.14	9.4966	0.8802	1.0884 _n	1.1905	0.966	50 21	321 40	0.9937	1.2959	0.7257 _n
Feb. 10.11	9.5298	0.8717	1.1633 _n	1.1112	1.043	47 38	311 34	1.0032	1.2894	0.8005 _n
20.08	9.5567	0.8639	1.2153 _n	0.9975	+1.109	45 21	301 12	1.0118	1.2831	0.8524 _n
Mar. 2.06	9.5791	0.8580	1.2492 _n	0.8244	1.168	43 29	290 36	1.0203	1.2780	0.8864 _n
12.03	9.5982	0.8552	1.2682 _n	0.5081	1.220	42 02	279 51	1.0293	1.2747	0.9054 _n
22.00	9.6154	0.8564	1.2736 _n	9.4942 _n	1.269	41 00	269 03	1.0395	1.2737	0.9108 _n
31.98	9.6320	0.8615	1.2660 _n	0.5815 _n	1.319	40 15	258 19	1.0513	1.2751	0.9031 _n
Apr. 10.95	9.6491	0.8702	1.2451 _n	0.8565 _n	+1.371	39 42	247 46	1.0649	1.2787	0.8823 _n
20.92	9.6673	0.8812	1.2098 _n	1.0142 _n	1.430	39 14	237 29	1.0802	1.2838	0.8470 _n
30.89	9.6869	0.8936	1.1578 _n	1.1194 _n	1.496	38 46	227 32	1.0970	1.2899	0.7950 _n
May 10.87	9.7081	0.9062	1.0846 _n	1.1933 _n	1.570	38 13	217 54	1.1148	1.2962	0.7218 _n
20.84	9.7305	0.9177	0.9818 _n	1.2455 _n	1.653	37 32	208 35	1.1331	1.3019	0.6189 _n
30.81	9.7535	0.9276	0.8305 _n	1.2809 _n	+1.744	36 41	199 31	1.1513	1.3066	0.4677 _n
June 9.78	9.7767	0.9348	0.5765 _n	1.3022 _n	1.839	35 41	190 39	1.1690	1.3097	0.2136 _n
19.76	9.7994	0.9391	9.8280 _n	1.3108 _n	1.938	34 32	181 53	1.1856	1.3111	9.4653 _n
29.73	9.8211	0.9404	0.3869	1.3074 _n	2.037	33 18	173 09	1.2009	1.3105	0.0241
July 9.70	9.8413	0.9388	0.7387	1.2918 _n	2.134	31 59	164 22	1.2148	1.3082	0.3759
19.68	9.8597	0.9345	0.9229	1.2630 _n	+2.226	30 39	155 26	1.2270	1.3042	0.5601
29.65	9.8761	0.9283	1.0429	1.2190 _n	2.312	29 22	146 19	1.2378	1.2989	0.6801
Aug. 8.62	9.8905	0.9211	1.1273	1.1564 _n	2.390	28 10	136 55	1.2472	1.2928	0.7644
18.59	9.9029	0.9136	1.1877	1.0683 _n	2.459	27 05	127 13	1.2553	1.2866	0.8249
28.57	9.9136	0.9070	1.2300	0.9412 _n	2.521	26 10	117 13	1.2626	1.2810	0.8672
Sept. 7.54	9.9229	0.9024	1.2574	0.7408 _n	+2.575	25 27	106 56	1.2692	1.2766	0.8945
17.51	9.9313	0.9005	1.2714	0.3226 _n	2.625	24 56	96 25	1.2757	1.2741	0.9085
27.48	9.9392	0.9019	1.2727	0.1392	2.673	24 36	85 48	1.2825	1.2738	0.9098
Oct. 7.46	9.9472	0.9069	1.2612	0.6848	2.722	24 27	75 09	1.2899	1.2759	0.8983
17.43	9.9556	0.9149	1.2359	0.9126	2.776	24 26	64 35	1.2983	1.2801	0.8731
27.40	9.9650	0.9250	1.1949	1.0527	+2.836	24 28	54 13	1.3078	1.2858	0.8321
Nov. 6.37	9.9754	0.9363	1.1346	1.1485	2.905	24 31	44 05	1.3184	1.2922	0.7718
16.35	9.9870	0.9476	1.0483	1.2162	2.984	24 30	34 11	1.3300	1.2986	0.6854
26.32	9.9997	0.9576	0.9224	1.2631	3.072	24 22	24 32	1.3422	1.3042	0.5596
Dec. 6.29	0.0131	0.9654	0.7230	1.2932	3.168	24 05	15 03	1.3546	1.3084	0.3601
16.27	0.0268	0.9704	0.3071	1.3086	+3.270	23 40	5 41	1.3669	1.3107	9.9442
26.24	0.0404	0.9721	0.1123 _n	1.3101	3.374	23 06	356 22	1.3786	1.3109	9.7494 _n
36.21	0.0534	0.9705	0.6609 _n	1.2978	+3.476	22 24	347 00	1.3894	1.3090	0.2981 _n

$E = +0^{\circ}.001$

All short period terms have been omitted from the numbers on this page; the subscript 1 denotes the omission of these terms.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
905	2 Ceti	4.62	A0	0 01 35.331	+3.0721	+ 17	-17 34 10.98	+20.040	- 2
1001	45 G. Tucanæ . .	5.64	B9	0 02 34.689	3.0368	+ 92	-71 40 14.63	20.025	- 16
1002	33 Piscium	4.68	K0	0 03 11.092	3.0707	- 8	- 5 56 32.62	20.137	+ 97
1003	9 G. Ceti	6.06	F0	0 04 41.221	3.0689	+ 73	-23 20 27.04	19.998	- 40
1	α Andromedæ . .	2.15	A0 _p	0 06 12.668	3.1038	+ 103	+28 51 31.13	19.876	- 159
2	β Cassiopeiæ . .	2.42	F5	0 06 55.369	+3.2082	+ 676	+58 55 05.58	+19.855	- 178
3	ϵ Phœnicis . . .	3.94	K0	0 07 17.129	3.0420	+ 126	-45 58 44.40	19.862	- 170
4	22 Andromedæ . .	5.08	F0	0 08 07.706	3.1227	+ 3	+45 50 19.12	20.032	+ 3
5	κ^2 Sculptoris . .	5.56	K0	0 09 26.591	3.0449	+ 8	-28 02 00.73	20.050	+ 25
6	θ Sculptoris . . .	5.19	F5	0 09 36.024	3.0465	+ 129	-35 22 04.59	20.160	+ 136
7	γ Pegasi	2.87	B2	0 11 04.169	+3.0908	+ 1	+14 57 00.68	+20.012	- 6
S α	$\circ$ Octantis	7.22	A0	0 12 18.11	0.196	+ 43	-88 35 47.37	20.016	+ 3
1004	χ Pegasi	4.94	M0	0 12 25.506	3.1063	+ 65	+19 58 23.71	20.017	+ 5
1005	σ Andromedæ . .	4.51	A2	0 16 07.558	3.1375	- 57	+36 33 09.42	19.957	- 35
1006	Pi. 0 ^h 38 And . .	5.80	A0	0 16 26.295	3.1364	+ 47	+31 17 03.33	19.994	+ 4
9	ι Ceti	3.75	K0	0 17 17.233	+3.0561	- 12	- 9 03 23.54	+19.958	- 27
10	ζ Tucanæ	4.34	F8	0 17 53.732	3.1188	+2704	-65 07 17.15	21.153	+1173
1007	B.D.-18° 41 Ceti .	6.88	K0	0 17 55.258	3.0446	+ 50	-17 55 59.85	19.989	+ 9
1008	41 Piscium	5.58	K0	0 18 26.016	3.0881	- 4	+ 7 57 25.80	19.992	+ 15
1009	ρ Andromedæ . .	5.20	F5	0 18 54.089	3.1637	+ 49	+37 44 10.25	19.940	- 34
1010	44 Piscium	5.99	G5	0 23 14.890	+3.0766	- 9	+ 1 42 26.25	+19.929	- 10
11	β Hydri	2.90	G0	0 23 34.608	3.1409	+6864	-77 29 26.31	20.264	+ 329
12	α Phœnicis	2.44	K0	0 24 12.748	2.9630	+ 189	-42 32 01.74	19.546	- 384
1011	Pi. 0 ^h 78 Ceti . .	7.54	M3	0 25 52.652	3.0447	+ 30	-11 53 27.61	19.899	- 15
1012	48 Piscium	6.46	K2	0 26 01.533	3.1186	+ 11	+16 12 46.77	19.902	- 11
13	12 Ceti*	6.05	K5	0 27 53.662	+3.0622	+ 6	- 4 11 20.74	+19.890	- 3
14	49 G. Ceti	5.23	A3	0 28 16.731	2.9982	- 19	-24 01 11.14	19.911	+ 22
15	λ^1 Phœnicis	4.88	A2	0 29 23.719	2.8910	+ 145	-49 02 07.78	19.907	+ 30
16	κ Cassiopeiæ . . .	4.24	B0	0 30 35.628	3.4179	- 5	+62 42 01.19	19.867	+ 4
1013	77 G. Sculptoris . .	5.62	K0	0 31 36.497	2.9661	- 21	-29 47 22.59	19.819	- 32
1014	58 G. Phœnicis . .	5.55	F5	0 32 28.178	+2.8505	+ 241	-52 36 17.80	+19.880	+ 39
17	ζ Cassiopeiæ . . .	3.72	B3	0 34 37.087	3.3487	+ 17	+53 39 57.89	19.808	- 6
18	π Andromedæ . . .	4.47	B3	0 34 37.841	3.2078	+ 12	+33 29 18.31	19.813	0
19	ϵ Andromedæ . . .	4.52	G5	0 36 19.792	3.1732	- 177	+29 05 02.65	19.543	- 247
20	δ Andromedæ . . .	3.49	K2	0 37 04.535	3.2114	+ 104	+30 37 53.11	19.692	- 88
21	α Cassiopeiæ* . .	Var.	K0	0 38 06.566	+3.4114	+ 60	+56 18 26.56	+19.737	- 28
1015	μ Phœnicis	4.65	K0	0 39 20.633	2.8317	- 26	-46 18 54.64	19.758	+ 11
1016	Lac. 181 Sculptoris	7.21	M0	0 40 35.598	2.8989	- 18	-36 15 08.81	19.738	+ 10
23	η Phœnicis	4.53	A0	0 41 28.403	2.6934	+ 4	-57 41 35.01	19.736	+ 21
22	β Ceti	2.24	K0	0 41 28.905	3.0107	+ 165	-18 13 00.54	19.754	+ 40
26	λ^2 Sculptoris . . .	5.97	K0	0 42 10.387	+2.8979	+ 201	-38 39 09.71	+19.830	+ 127
25	$\circ$ Cassiopeiæ . . .	4.70	B2	0 42 22.424	3.3487	+ 17	+48 03 17.60	19.697	- 3
24	21 Cassiopeiæ* . .	5.61	A2	0 42 50.173	3.9803	- 53	+74 45 32.12	19.673	- 20
1017	70 G. Phœnicis . .	6.00	A5	0 42 58.115	+2.8340	- 79	-42 54 18.45	+19.591	- 100

No. 13: 11^m 0, 10^m, 190°.
No. 21: 2^m.1 to 2^m.6.No. 24: 5^m.7 to 6^m.1 (*Kopff*).

MEAN PLACES OF STARS, 1958.0

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
27	ζ Andromedæ . . .	4.30	K0	0 45 06.418	+3.1826	- 75	+24 02 20.67	+19.579	- 76
1018	79 G. Ceti	5.45	B9	0 45 56.386	2.9679	+ 17	-21 57 05.11	19.631	- 9
1019	96 G. Piscium . . .	5.82	G5	0 46 10.626	3.1476	+ 505	+ 5 03 53.81	18.494	-1142
28	δ Piscium	4.55	K5	0 46 30.017	3.1138	+ 55	+ 7 21 24.67	19.586	- 45
1020	64 Piscium	5.23	F5	0 46 46.022	3.1546	- 2	+16 42 51.28	19.428	- 197
31	λ Hydri	4.96	K5	0 47 08.402	+2.0792	+ 353	-75 09 06.53	+19.595	- 24
1021	ν Andromedæ . . .	4.42	B3	0 47 29.312	3.3128	+ 15	+40 51 01.99	19.596	- 17
30	φ ² Ceti*	5.24	F5	0 48 01.317	3.0044	- 157	-10 52 12.37	19.383	- 220
29	Br. 82 Cassiopeiae .	5.45	F2, A2	0 48 09.433	3.6497	+ 39	+64 01 09.68	19.594	- 6
1022	20 Ceti	4.92	K0	0 50 51.574	3.0667	+ 3	- 1 22 19.16	19.537	- 13
34	λ ² Tucanæ	5.34	K0	0 53 26.564	+2.2382	+ 20	-69 45 14.06	+19.463	- 36
32	γ Cassiopeiae* . .	Var.	B0p	0 54 09.306	3.6293	+ 28	+60 29 23.26	19.482	- 2
33	μ Andromedæ . . .	3.94	A2	0 54 24.820	3.3342	+ 127	+38 16 19.18	19.516	+ 37
1023	68 Piscium	5.64	K0	0 55 33.362	3.2498	+ 2	+28 45 55.98	19.448	- 7
35	α Sculptoris	4.39	B5	0 56 34.985	2.8892	+ 12	-29 35 02.68	19.441	+ 7
1024	98 G. Ceti	6.70	K0	0 56 38.029	+3.0388	+ 3	- 6 06 29.92	+19.359	- 73
1025	101 G. Ceti	6.58	G5	0 59 33.587	2.9772	+ 55	-16 29 24.51	19.297	- 71
1027	80 G. Phœnicis . .	6.00	K0	1 00 15.449	2.5337	- 2	-57 13 41.14	19.381	+ 29
1026	σ Sculptoris	5.52	A2	1 00 26.129	2.8633	+ 57	-31 46 39.85	19.365	+ 17
36	ε Piscium	4.45	K0	1 00 45.617	3.1151	- 54	+ 7 39 52.09	19.371	+ 30
37	26 Ceti*	6.18	F0	1 01 39.167	+3.0884	+ 78	+ 1 08 31.74	+19.285	- 36
N a	43 H. Cephei	4.52	K0	1 02 37.04	8.360	+ 79	+86 01 58.70	19.290	- 7
1028	72 Piscium	5.65	F2	1 02 52.076	3.1690	+ 4	+14 43 14.44	19.351	+ 59
1029	106 G. Ceti	6.29	G5	1 04 05.714	2.9056	- 19	-24 12 59.89	19.220	- 42
1030	μ Cassiopeiae . . .	5.26	G5	1 05 27.626	4.0002	+3945	+54 42 54.35	17.652	-1577
39	ι Tucanæ	5.32	K0	1 05 39.121	+2.3741	+ 108	-61 59 56.98	+19.226	+ 2
1031	ν Phœnicis	5.15	A3	1 05 52.885	2.7392	+ 35	-41 42 40.61	19.223	+ 4
40	η Ceti	3.60	K0	1 06 28.569	3.0180	+ 147	-10 24 15.68	19.076	- 128
42	β Andromedæ	2.37	M0	1 07 22.361	3.3633	+ 146	+35 23 54.23	19.070	- 112
41	44 H. Cephei	5.68	A0	1 08 33.932	5.2227	+ 327	+79 27 04.46	19.152	+ 2
1032	χ Piscium	4.89	K0	1 09 11.444	+3.2271	+ 26	+20 48 42.79	+19.130	- 5
43	τ Piscium	4.70	K0	1 09 20.415	3.3075	+ 53	+29 52 01.92	19.099	- 32
44	102 G. Sculptoris . .	5.91	A5	1 10 49.400	2.7618	+ 68	-38 04 42.89	19.067	- 25
1033	ζ Piscium* p. . . .	5.57	A5	1 11 32.017	3.1359	+ 95	+ 7 21 13.54	19.023	- 50
1034	89 Piscium	5.28	A2	1 15 37.772	3.0956	- 35	+ 3 23 37.79	18.941	- 19
45	ν Piscium	4.67	A2	1 17 09.090	+3.3005	+ 16	+27 02 37.95	+18.907	- 9
1035	ξ Andromedæ	4.99	K0	1 19 51.400	3.5379	+ 31	+45 18 33.63	18.847	+ 11
1036	109 G. Sculptoris . .	5.82	K5	1 21 33.771	2.7913	- 6	-31 09 50.14	18.749	- 37
47	θ Ceti	3.83	K0	1 21 55.358	2.9990	- 54	- 8 23 58.52	18.559	- 215
1037	138 G. Ceti	6.38	G5	1 22 40.532	3.0493	+ 11	- 3 04 00.10	18.725	- 26
46	ψ Cassiopeiae	4.97	K0	1 22 56.175	+4.2523	+ 126	+67 54 41.85	+18.773	+ 30
48	δ Cassiopeiae	2.80	A5	1 23 02.931	3.9345	+ 397	+60 01 03.93	18.693	- 46
1038	9 G. Hydri	5.82	K5	1 23 38.245	2.0723	+ 27	-64 35 14.88	18.711	- 10
1039	94 Piscium	5.63	K0	1 24 25.234	+3.2425	+ 31	+19 01 24.11	+18.640	- 57

No. 30: 19 Ceti.
No. 32: 1^m.6 to 2^m.3 (Kopff).

No. 37: 9^m.0, 17'', 254°.
No. 1033: 6^m.5, 23'', 63°.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
1041	47 Ceti	5.68	F0	1 24 47.171	+ 2.9606	+ 12	-13 16 27.55	+18.697	+ 12
1040	ω Andromedæ . . .	4.96	F5	1 25 07.856	3.5940	+ 321	+45 11 26.20	18.573	-101
49	γ Phœnicis	3.40	K5	1 26 32.590	2.6037	- 16	-43 31 58.09	18.431	-198
1043	48 Ceti	5.13	A0	1 27 35.234	2.8776	+ 40	-21 50 45.80	18.604	+ 9
1042	38 Cassiopeïæ . . .	5.95	F5	1 28 04.133	4.4805	+ 264	+70 02 57.92	18.509	- 70
50	η Piscium	3.72	G5	1 29 13.887	+ 3.2124	+ 18	+15 07 47.62	+18.538	- 3
1044	δ Phœnicis	3.96	K0	1 29 30.271	2.4959	+ 137	-49 17 25.41	18.694	+162
53	14 G. Hydri	6.06	G5	1 33 21.216	0.4132	- 75	-78 43 03.70	18.284	-118
1045	ν Andromedæ . . .	4.18	G0	1 34 19.335	3.5261	- 154	+41 11 46.19	17.989	-378
1046	π Piscium	5.63	F0	1 34 52.083	3.1824	- 46	+11 55 38.79	18.397	+ 48
51	40 Cassiopeïæ . . .	5.50	K0	1 35 06.855	+ 4.8140	- 37	+72 49 37.17	+18.329	- 10
52	51 Andromedæ* . .	3.77	K0	1 35 24.129	3.6891	+ 66	+48 24 58.52	18.221	-109
54	α Eridani*	0.60	B5	1 36 09.160	2.2333	+ 126	-57 26 58.35	18.280	- 23
55	43 Cassiopeïæ . . .	5.54	A0 _p	1 39 11.981	4.4582	+ 87	+67 49 53.91	18.189	- 3
56	ν Piscium	4.68	K0	1 39 14.538	3.1236	- 17	+ 5 16 32.75	18.198	+ 7
1047	B.D.+34° 297 Tri .	5.45	B8	1 39 37.317	+ 3.4718	+ 38	+35 02 03.70	+18.147	- 30
58	4 G. Octantis . . .	5.63	K0	1 39 38.47	- 3.210	+ 21	-84 58 57.12	18.203	+ 24
58	129 G. Sculptoris .	5.64	A0	1 40 11.867	+ 2.6425	- 39	-37 02 37.19	18.137	- 19
1048	π Sculptoris	5.28	K0	1 40 14.839	2.7061	- 62	-32 32 16.88	18.140	- 14
1049	175 G. Ceti	5.27	G5	1 40 35.987	3.0346	- 1	- 3 54 03.93	18.109	- 32
57	φ Persei	4.19	B0 _p	1 41 00.864	+ 3.7672	+ 26	+50 28 40.90	+18.114	- 11
59	τ Ceti	3.65	K0	1 42 06.962	2.7875	-1191	-16 09 28.86	18.914	+860
60	ο Piscium	4.50	K0	1 43 10.325	3.1698	+ 48	+ 8 56 49.59	18.098	+ 54
61	ε Sculptoris*	5.42	F0	1 43 40.728	2.8095	+ 117	-25 15 42.58	17.973	- 52
1050	4 Arietis	5.73	A0	1 45 53.931	3.2561	+ 34	+16 44 49.86	17.909	- 30
1051	χ Ceti	4.77	F0	1 47 31.222	+ 2.9469	- 103	-10 53 36.45	+17.786	- 90
62	ζ Ceti	3.92	K0	1 49 23.139	2.9617	+ 25	-10 32 30.49	17.769	- 33
1052	2 Persei	5.64	B9	1 49 28.217	3.8223	+ 12	+50 35 10.17	17.775	- 23
64	α Trianguli	3.58	F5	1 50 40.818	3.4236	+ 8	+29 22 30.31	17.518	-231
63	ε Cassiopeïæ	3.44	B3	1 51 20.917	4.3274	+ 40	+63 27 51.58	17.704	- 17
65	ξ Piscium	4.84	K0	1 51 22.694	+ 3.1074	+ 14	+ 2 58 51.51	+17.748	+ 28
67	ψ Phœnicis	4.41	M3	1 51 57.812	2.4042	- 82	-46 30 27.79	17.618	- 79
66	β Arietis	2.72	A5	1 52 18.866	3.3168	+ 68	+20 36 12.71	17.574	-108
1053	φ Phœnicis	5.00	B9	1 52 37.455	2.4877	- 38	-42 42 08.36	17.651	- 18
69	η ³ Hydri	4.72	K0	1 53 52.081	1.5215	+ 128	-67 51 12.21	17.705	+ 87
N b	α Ursæ Minoris* . .	2.12	F8	1 54 15.65	+42.754	+185	+89 04 05.40	+17.581	- 6
68	χ Eridani	3.73	G5	1 54 19.496	2.3339	+ 733	-51 49 02.38	17.899	+300
72	α Hydri	3.02	F0	1 57 26.809	1.8904	+ 374	-61 46 24.97	17.506	+ 39
71	ν Ceti	4.18	M0	1 58 01.514	2.8264	+ 93	-21 16 50.03	17.426	- 16
1054	4 Persei	4.99	B8	1 59 29.320	4.0031	+ 37	+54 17 08.18	17.380	+ 3
70	50 Cassiopeïæ . . .	4.06	A2	1 59 48.174	+ 5.1441	- 104	+72 13 10.09	+17.392	+ 28
73	γ Andromedæ* p. .	2.28	K0	2 01 18.680	3.6882	+ 44	+42 07 45.17	17.251	- 47
1055	ν Fornacis	4.74	A0 _p	2 02 36.453	+ 2.6885	+ 4	-29 29 51.71	+17.250	+ 10

No. 52: ν Persei.
 No. 54: Achernar.
 No. 61: 8^m.3, 4^s.5, 37°.

No. Nb: Polaris (var.).
 No. 73: 5^m.1, 10^s., 63°.

MEAN PLACES OF STARS, 1958.0
FOR JANUARY 0^d.861 UNIVERSAL TIME
(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
74	α Arietis	2.23	K2	2 04 47.989	+ 3.3849	+ 138	+23 15 53.11	+16.998	- 144
75	β Trianguli	3.08	A5	2 07 02.159	3.5741	+ 119	+34 47 22.60	17.001	- 38
1056	15 Arietis	5.92	M0	2 08 17.581	3.3282	+ 62	+19 18 11.37	16.958	- 23
<i>N</i> α	Br. 256 Cephei . . .	6.86	K0	2 10 05.99	9.296	+ 39	+83 21 59.72	16.854	- 41
1057	19 Arietis	5.99	K5	2 10 45.560	3.2746	+ 66	+15 05 02.20	16.849	- 17
1058	ξ Ceti	4.54	G5	2 10 46.196	+ 3.1817	- 16	+ 8 39 02.39	+16.863	- 2
77	Br. 299 And*	5.40	K0	2 10 47.879	3.9976	+ 366	+50 52 18.80	16.698	- 166
78	μ Fornacis	5.24	A0	2 11 03.502	2.6417	+ 14	-30 55 12.24	16.864	+ 12
76	55 Cassiopeiae . . .	6.15	F5, A2	2 11 09.427	4.7224	- 23	+66 19 44.24	16.847	0
1060	135 G. Phœnicis . . .	5.86	K0	2 12 49.904	2.4264	- 27	-41 21 42.25	16.742	- 25
1059	21 Arietis	5.64	F5	2 13 19.419	+ 3.4069	- 66	+24 50 58.14	+16.666	- 78
79	γ Trianguli	4.07	A0	2 14 48.555	3.5706	+ 35	+33 39 14.68	16.628	- 44
80	67 Ceti	5.70	G5	2 14 53.196	2.9934	+ 60	- 6 36 53.44	16.563	- 105
82	ϕ Eridani	3.78	B8	2 15 00.535	2.1430	+ 98	-51 42 21.26	16.647	- 16
1062	21 G. Fornacis . . .	6.74	G5	2 15 33.074	2.5425	+ 139	-36 10 37.16	16.696	+ 60
81	θ Arietis	5.69	A0	2 15 47.037	+ 3.3399	- 9	+19 42 28.28	+16.627	+ 3
1061	232 G. Ceti	5.82	F8	2 15 50.322	3.1181	+ 243	+ 1 33 36.83	17.003	+ 381
1063	62 Andromedæ . . .	5.12	A0	2 16 33.462	3.8773	- 58	+47 11 14.62	16.584	- 2
1064	239 G. Ceti	5.99	K0	2 20 06.193	2.8276	+ 12	-17 51 08.69	16.360	- 51
83	κ Fornacis	5.37	F5	2 20 37.215	2.7454	+ 147	-24 00 22.96	16.330	- 55
1065	δ Hydri	4.26	A2	2 20 59.777	+ 1.0724	- 79	-68 51 00.51	+16.380	+ 13
1067	κ Hydri	6.00	K0	2 22 36.291	0.3683	- 187	-73 50 09.50	16.297	+ 11
84	λ Horologii	5.47	F2	2 23 43.346	1.6781	- 95	-60 29 57.86	16.103	- 125
1066	ρ Ceti	4.90	A0	2 23 55.139	2.8986	- 12	-12 28 44.34	16.214	- 3
86	κ Eridani	4.44	B5	2 25 26.744	2.1990	+ 21	-47 53 29.92	16.137	- 1
1068	12 Trianguli	5.38	F0	2 25 41.794	+ 3.5206	- 15	+29 28 58.67	+16.042	- 83
85	ξ^2 Ceti	4.34	A0	2 25 55.317	+ 3.1915	+ 25	+ 8 16 22.19	16.111	- 3
<i>S</i> β	Lac. 1029 Octantis . .	7.76	F0	2 27 03.07	- 8.090	0	-85 54 24.55	16.038	- 22
1069	27 Arietis	6.41	G5	2 28 34.306	+ 3.3303	+ 22	+17 31 08.88	15.894	- 81
1070	14 Trianguli	5.35	K0	2 29 31.850	3.6659	+ 37	+35 57 43.94	15.942	+ 18
1071	σ Ceti	4.82	F5	2 30 05.694	+ 2.8436	- 53	-15 25 41.18	+15.777	- 117
88	λ^1 Fornacis	5.88	K0	2 31 21.893	+ 2.5011	- 19	-34 50 02.18	15.810	- 17
90	μ Hydri	5.29	K0	2 32 30.873	- 1.2428	+ 456	-79 17 34.10	15.729	- 37
1072	ν Ceti*	5.04	G5	2 33 39.985	+ 3.1500	- 21	+ 5 24 39.48	15.680	- 21
1073	268 G. Ceti	5.92	K0	2 33 46.436	3.2919	+1211	+ 6 41 15.23	17.157	+1462
1074	80 Ceti	5.71	K5	2 33 55.859	+ 2.9539	- 25	- 8 00 47.95	+15.632	- 55
87	36 H. Cassiopeiae . .	5.34	K0	2 33 59.443	+ 5.7264	- 80	+72 38 11.39	15.706	+ 23
<i>S</i> γ	Lac. 1848 Octantis . .	8.35	G5	2 34 36.31	-25.585	- 48	-88 20 00.23	15.643	- 21
89	ν Arietis	5.36	A2	2 36 25.527	+ 3.4094	- 9	+21 46 51.35	15.538	- 13
91	δ Ceti	4.04	B2	2 37 19.593	3.0763	+ 7	+ 0 08 54.26	15.504	+ 3
95	ϵ Hydri	4.26	B9	2 38 56.223	+ 0.9283	+ 170	-68 26 47.12	+15.428	+ 15
1075	ι Eridani	4.06	K0	2 39 00.548	2.3671	+ 115	-40 02 03.61	15.382	- 25
1076	ζ Horologii	5.26	F2	2 39 21.192	1.8681	+ 48	-54 43 44.66	15.398	+ 10
94	35 Arietis	4.58	B3	2 40 58.834	+ 3.5240	+ 5	+27 31 46.84	+15.291	- 5

No. 77: 6 Persei.

No. 1072: 9^m.6, 8'', 83°.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
92	Br. 366 Cas	5.84	A2	2 41 10.878	+5.1779	+ 23	+67 38 52.57	+15.255	- 29
93	θ Persei	4.22	F8	2 41 19.101	4.1047	+ 344	+49 03 08.10	15.193	- 84
1077	14 Persei	5.58	G5	2 41 20.394	3.9125	+ 3	+44 07 11.24	15.270	- 6
97	π Ceti	4.39	B5	2 42 07.317	2.8557	- 6	-14 02 08.20	15.221	- 11
1078	43 G. Fornacis*	6.87	G0	2 42 22.551	2.6678	+ 123	-25 40 22.04	15.278	+ 61
98	μ Ceti	4.36	F0	2 42 40.055	+3.2450	+ 190	+ 9 56 16.45	+15.170	- 30
101	β Fornacis	4.50	K0	2 47 19.934	2.5111	+ 72	-32 34 52.95	15.095	+163
100	41 Arietis	3.68	B8	2 47 30.303	3.5346	+ 49	+27 05 19.06	14.808	-113
99	η Persei	3.95	K0	2 47 36.984	4.3853	+ 22	+55 43 21.90	14.904	- 10
102	γ ² Eridani	4.81	K0	2 49 07.925	2.7216	- 36	-21 10 34.45	14.808	- 18
1079	σ Arietis	5.46	B5	2 49 10.169	+3.3151	+ 22	+14 54 36.51	+14.800	- 23
103	τ Persei	4.06	G0, A5	2 51 15.935	4.2614	+ 3	+52 35 31.58	14.697	- 2
104	η Eridani	4.05	K0	2 54 22.412	2.9318	+ 53	- 9 03 51.23	14.300	-214
1080	40 G. Eridani	5.27	A2	2 54 30.949	3.0086	- 23	- 3 52 49.29	14.464	- 41
1081	47 Arietis	5.85	F0	2 55 40.651	3.4366	+ 165	+20 30 05.36	14.406	- 28
1082	24 Persei	4.97	K0	2 56 27.034	+3.7210	- 42	+35 00 58.15	+14.398	+ 10
106	θ Eridani* <i>p</i>	3.42	A2	2 56 40.065	2.2745	- 46	-40 28 19.58	14.401	+ 26
1083	λ Ceti	4.69	B5	2 57 27.595	3.2172	+ 1	+ 8 44 28.11	14.316	- 10
107	α Ceti	2.82	M0	3 00 04.849	3.1377	- 6	+ 3 55 34.03	14.092	- 73
1084	B.D.-18° 516 Eri	7.40	F0	3 00 06.689	2.7578	- 17	-18 22 18.51	14.142	- 22
105	47 H. Cephei*	5.72	M0	3 00 25.404	+8.0501	- 138	+79 15 19.87	+14.152	+ 11
1085	γ ³ Eridani	4.16	A3	3 00 32.343	2.6455	- 105	-23 47 17.13	14.090	- 47
1086	58 G. Eridani	5.66	K0	3 01 29.625	2.0505	+ 18	-47 08 19.59	14.092	+ 14
108	γ Persei	3.08	F5, A3	3 01 44.396	4.3530	+ 2	+53 20 36.91	14.059	- 3
113	θ Hydri	5.52	B8	3 02 09.345	0.1337	+ 65	-72 03 58.99	14.661	+ 23
109	ρ Persei*	Var.	M3	3 02 28.577	+3.8491	+ 111	+38 40 44.21	+13.912	-104
110	μ Horologii	5.16	F0	3 02 37.227	1.4150	- 101	-59 53 59.94	13.956	- 52
1087	63 G. Eridani	7.16	G0	3 05 19.531	2.8345	+ 5	-13 55 09.96	13.584	-253
111	β Persei*	Var.	B8	3 05 25.626	3.9087	+ 6	+40 47 43.29	13.833	+ 3
112	ι Persei	4.17	G0	3 06 01.385	4.3365	+1298	+49 27 16.60	13.714	- 78
1088	55 Arietis	5.60	B9	3 07 04.731	+3.6129	+ 15	+28 55 04.97	+13.716	- 10
114	δ Arietis	4.53	K0	3 09 13.344	3.4333	+ 107	+19 34 09.11	13.584	- 5
116	94 Ceti*	5.14	F8	3 10 37.663	3.0633	+ 131	- 1 21 07.03	13.439	- 59
118	38 G. Horologii	5.72	N0	3 11 29.090	1.5204	+ 11	-57 28 41.44	13.461	+ 17
1089	ζ Arietis	4.95	A0	3 12 28.926	3.4512	- 19	+20 53 24.42	13.305	- 72
1090	79 G. Fornacis	6.85	G0	3 13 00.908	+2.3592	+ 24	-35 42 47.01	+13.355	+ 12
1091	ζ Eridani	4.90	A3	3 13 47.464	2.9152	- 4	- 8 58 28.54	13.343	+ 51
115	48 H. Cephei*	5.50	F0	3 14 55.050	7.6561	+ 196	+77 35 00.26	13.161	- 55
1092	Lac. 1044 Fornacis	6.89	A0	3 15 11.758	+2.4587	+ 14	-31 30 18.42	13.181	- 20
1095	ι Hydri	5.53	F2	3 16 57.957	-1.4732	+ 336	-77 32 32.28	13.152	+ 66
1093	κ Ceti	4.96	G5	3 17 09.308	+3.1482	+ 178	+ 3 13 02.75	+13.169	+ 98
119	82 G. Eridani*	4.30	G5	3 18 15.010	2.3959	+2784	-43 13 45.40	13.748	+750
1094	τ Arietis	5.17	B3	3 18 47.828	+3.4665	+ 19	+20 59 49.05	+12.936	- 25

No. 1078: 9^m.0, 12^o, 192°.
 No. 106: 4^m.4, 8^o, 89°.
 No. 105: 9^m.8, 4^o.8, 230°.
 No. 109: 3^m.3 to 4^m.1.

No. 111: *Algol*. 2^m.2 to 3^m.5.
 No. 116: 11^m.5, 3^o.4, 237°.
 No. 115: 10^m.0, about 1^o.
 No. 119: *e* Eridani.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
1096	Pi. 3 ^b 27 Cam . . .	5.55	K2	3 21 00.267	+ 5.2204	- 13	+64 26 16.77	+12.817	+ 4
120	α Persei	1.90	F5	3 21 18.755	4.2899	+ 30	+49 42 48.35	12.770	- 22
N β	Br. 402 Cephei . . .	5.78	K0	3 22 00.93	14.398	+56	+84 46 04.96	12.609	-130
121	$\circ$ Tauri	3.80	G5	3 22 32.964	3.2304	- 45	+ 8 52 56.68	12.638	- 71
123	ξ Tauri	3.75	B8	3 24 53.351	3.2534	+ 39	+ 9 35 15.58	12.519	- 32
122	2 H. Cam*	4.44	B9 _p	3 25 38.962	+ 4.8678	- 2	+59 47 45.27	+12.497	0
124	σ Persei	4.55	K0	3 27 36.159	4.2361	+ 8	+47 51 07.20	12.388	+ 24
1097	17 Eridani	4.80	B9	3 28 31.856	2.9779	+ 8	- 5 13 04.40	12.313	+ 13
125	5 Tauri*	4.28	K0	3 28 33.024	3.3145	+ 15	+12 47 38.86	12.302	+ 3
126	κ Reticuli	4.80	F5	3 28 38.295	1.0500	+550	-63 05 06.27	12.675	+380
1098	B.D.+34° 674 Per . .	5.80	B3	3 29 59.117	+ 3.8239	- 7	+35 19 13.71	+12.203	+ 4
127	ϵ Eridani	3.81	K0	3 30 56.977	2.8276	-660	- 9 35 57.40	12.155	+ 21
128	45 G. Horologii . . .	5.60	K0	3 31 19.400	1.7884	+ 75	-50 31 13.46	12.195	+ 87
1099	τ^5 Eridani	4.32	B8	3 31 55.855	2.6503	+ 30	-21 46 21.64	12.039	- 25
1100	20 Eridani	5.32	A0 _p	3 34 22.467	2.7339	+ 17	-17 36 17.88	11.888	- 5
1101	10 Tauri	4.40	G5	3 34 43.600	+ 3.0629	-156	+ 0 16 10.77	+11.388	-480
130	110 G. Eridani* . . .	4.58	K0	3 35 35.129	2.1530	- 13	-40 24 41.26	11.785	- 23
1102	τ Fornacis	6.08	A0	3 37 02.734	2.4962	+ 13	-28 04 45.34	11.731	+ 26
1103	11 Tauri	6.15	A0	3 38 15.472	3.5865	+ 9	+25 11 42.75	11.608	- 10
129	Grb.716 Cam	5.32	M0	3 38 29.371	5.2169	- 27	+63 04 57.89	11.617	+ 17
131	δ Persei	3.10	B5	3 39 55.454	+ 4.2774	+ 31	+47 39 18.24	+11.466	- 32
133	δ Fornacis	4.93	B5	3 40 34.570	2.3865	0	-32 04 17.35	11.472	+ 19
135	δ Eridani	3.72	K0	3 41 14.050	2.8754	- 63	- 9 54 15.76	12.152	+746
134	ν Persei	3.93	F5	3 42 19.931	4.0809	- 8	+42 26 51.38	11.325	0
137	24 Eridani	5.09	B8	3 42 22.334	3.0486	0	- 1 17 39.44	11.320	- 3
136	17 Tauri	3.81	B5 _p	3 42 22.577	+ 3.5654	+ 15	+23 58 58.23	+11.281	- 41
1104	29 Tauri	5.36	B3	3 43 26.342	3.1893	+ 12	+ 5 55 11.69	11.241	- 5
141	β Reticuli	3.80	K0	3 43 39.942	0.7551	+481	-64 56 19.40	11.313	+ 82
139	η Tauri	2.96	B5 _p	3 44 58.972	3.5691	+ 15	+23 58 36.39	11.090	- 44
140	τ^6 Eridani	4.33	F8	3 45 02.371	2.5816	-116	-23 22 21.50	10.607	-523
138	γ Camelopardi* . . .	4.67	A0	3 45 53.335	+ 6.3508	+ 38	+71 12 20.08	+11.028	- 38
142	27 Tauri	3.80	B8	3 46 39.587	+ 3.5701	+ 13	+23 55 35.54	10.969	- 43
146	γ Hydri	3.17	M0	3 47 52.119	- 0.9163	+130	-74 22 05.07	11.045	+120
143	138 G. Eridani* . . .	4.24	K0	3 47 52.851	+ 2.2454	- 43	-36 19 34.88	10.880	- 43
1105	B.D.+57° 752 Cam . .	5.79	A0	3 50 17.786	4.8789	+106	+57 51 08.28	10.645	- 98
1106	Pi. 3 ^b 187 Tauri . . .	5.96	F0	3 50 45.677	+ 3.4331	+100	+17 12 12.48	+10.683	- 27
1107	145 G. Eridani	6.55	B9	3 51 04.767	2.9390	- 5	- 6 45 27.07	10.688	+ 1
144	ζ Persei	2.91	B1	3 51 29.160	3.7747	+ 7	+31 45 37.85	10.647	- 10
1108	55 G. Horologii . . .	5.77	K0	3 52 15.148	1.8597	+ 29	-47 00 58.68	10.571	- 30
147	ϵ Persei*	2.96	B1	3 55 01.676	4.0302	+ 18	+39 53 25.55	10.366	- 26
149	γ Eridani	3.19	K5	3 56 04.085	+ 2.8001	+ 43	-13 37 36.33	+10.208	-108
148	ξ Persei	4.05	Oe5	3 56 13.998	3.8966	+ 5	+35 40 18.99	10.302	- 1
1109	17 G. Reticuli	6.14	F2	3 57 48.609	+ 1.2898	+ 33	-57 13 15.23	+10.201	+ 16

No. 122: 9^m.0, 2^s.4, 161°.
 No. 125: f Tauri.
 No. 130: y Eridani.

No. 138: 5 H. Camelopardi.
 No. 143: g Eridani.
 No. 147: 7^m.9, 9^s, 9°.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
1110	δ Reticuli	4.41	M0	3 58 04.546	+ 0.9519	+ 8	-61 31 06.21	+10.152	- 14
150	λ Tauri*	Var.	B3	3 58 20.987	3.3258	- 4	+12 22 23.18	10.133	- 11
1111	35 Eridani	5.25	B5	3 59 24.169	3.0412	+ 14	- 1 39 57.54	10.052	- 12
151	ν Tauri	3.94	A0	4 00 55.124	+ 3.1929	+ 1	+ 5 52 27.25	9.950	+ 1
1114	63 G. Hydr. . . .	6.72	A0	4 00 57.711	- 0.3442	+ 57	-71 17 00.24	9.989	+ 41
1112	37 Tauri	4.50	K0	4 02 12.459	+ 3.5495	+ 66	+21 58 07.61	+ 9.797	- 54
1113	λ Persei	4.33	A0	4 03 26.705	4.4752	- 10	+50 14 21.22	9.720	- 36
153	174 G. Eridani . . .	5.57	A5	4 03 53.489	2.4737	+153	-27 45 55.91	9.828	+105
152	48 Persei*	4.03	B3 _p	4 05 36.192	4.3608	+ 24	+47 36 08.50	9.564	- 27
1115	43 Tauri	5.67	G5	4 06 42.909	3.4976	+ 76	+19 29 59.14	9.477	- 29
1116	44 Tauri	5.55	F0	4 08 16.103	+ 3.6566	- 22	+26 22 22.70	+ 9.350	- 36
154	ο Eridani	4.14	F2	4 09 48.783	2.9297	+ 6	- 6 56 44.66	9.352	+ 86
1117	μ Persei	4.28	G0	4 11 48.278	4.4102	+ 8	+48 18 16.52	9.093	- 18
155	α Horologii	3.83	K0	4 12 36.469	1.9882	+ 32	-42 23 49.20	8.846	-204
1118	μ Tauri	4.32	B3	4 13 15.033	3.2595	+ 15	+ 8 47 19.17	8.980	- 19
156	α Reticuli	3.36	G5	4 13 52.722	+ 0.7755	+ 61	-62 34 42.80	+ 9.004	+ 53
157	γ Doradus	4.36	F5	4 14 55.420	1.5730	+108	-51 35 30.25	9.061	+192
159	γ Tauri	3.86	K0	4 17 23.983	3.4163	+ 81	+15 31 39.97	8.651	- 23
158	54 Persei	5.10	G5	4 17 40.652	3.8987	- 20	+34 28 01.50	8.645	- 6
1119	208 G. Eridani . . .	6.65	B9	4 18 14.895	2.7168	+ 16	-16 32 12.01	8.603	- 4
161	212 G. Eridani . . .	5.31	A0	4 18 48.994	+ 2.6180	+ 19	-20 44 19.03	+ 8.554	- 8
162	δ Tauri	3.93	K0	4 20 30.544	+ 3.4620	+ 76	+17 26 44.17	8.400	- 27
166	δ Mensæ	5.62	K0 _p	4 20 46.161	- 4.0181	+130	-80 18 50.79	8.481	+ 69
163	η Reticuli	5.18	K0	4 21 25.768	+ 0.6521	+128	-63 29 08.77	8.531	+174
1120	ξ Eridani	5.23	A2	4 21 35.211	2.9883	- 36	- 3 50 28.41	8.287	- 55
N c	Grb.750 Cephei . .	6.70	F8	4 22 19.83	+18.342	+18	+85 26 10.59	+ 8.301	+ 28
1121	43 Eridani	4.06	K5	4 22 27.418	2.2537	+ 46	-34 06 47.85	8.328	+ 54
1122	B.D.+69° 258 Cam .	7.02	K0	4 25 25.766	6.3125	+ 16	+69 17 13.58	8.003	- 30
164	ε Tauri	3.63	K0	4 26 09.626	3.5053	+ 77	+19 05 20.13	7.942	- 34
1123	Br. 615 Tauri . . .	5.50	B8	4 26 21.687	+ 3.1019	+ 9	+ 1 17 20.77	7.941	- 20
S δ	12 G. Mensæ	6.76	A2	4 27 37.68	- 6.933	-10	-82 59 35.46	+ 7.868	+ 3
165	1 Cam* f	5.86	B1	4 28 41.605	+ 4.7575	0	+53 49 18.38	7.771	- 1
167	δ Cæli	5.16	B3	4 29 32.812	1.8383	+ 1	-45 02 34.69	7.707	+ 2
1124	57 Persei	6.07	F0	4 30 27.189	4.2252	+ 6	+42 58 34.20	7.634	+ 4
1125	ρ Tauri	4.75	A5	4 31 27.683	3.4063	+ 68	+14 45 27.85	7.526	- 23
171	α Doradus	3.47	A0 _p	4 33 05.165	+ 1.2979	+ 57	-55 07 52.08	+ 7.423	+ 4
168	α Tauri*	1.06	K5	4 33 30.455	3.4443	+ 46	+16 25 35.23	7.195	-188
170	ν Eridani	3.88	K0	4 33 54.966	2.3331	- 39	-30 38 50.03	7.341	- 10
169	ν Eridani	4.12	B2	4 34 13.094	2.9989	+ 2	- 3 26 12.85	7.323	- 2
172	53 Eridani*	3.98	K0	4 36 15.327	2.7486	- 48	-14 23 05.50	6.999	-160
1127	258 G. Eridani . . .	5.59	K0	4 38 21.933	+ 2.4966	- 45	-24 33 48.08	+ 7.005	+ 18
1126	Pi. 4 ^h 148 Tauri . .	5.68	A0	4 38 41.771	3.7576	+ 28	+28 32 07.22	6.927	- 32
1129	α Cæli	4.52	F2	4 39 12.364	+ 1.9328	-138	-41 56 35.02	+ 6.841	- 77

No. 150: 3^m.8 to 4^m.1.
 No. 152: c Persei.
 No. 165: 6^m.6, 10^m., 308°.

No. 168: Aldebaran.
 No. 172: 7^m.0, 1^m., 1°.

MEAN PLACES OF STARS, 1958.0

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
174	τ Tauri	4.33	B5	4 39 43.225	+3.6029	- 1	+22 52 41.07	+6.860	- 15
1128	Grb.866 Persei	5.77	B8	4 40 09.582	4.5645	- 2	+49 53 44.36	6.819	- 19
1130	β Cæli	5.08	F5	4 40 34.226	2.1217	+ 30	-37 13 31.08	7.005	+199
1131	56 Eridani	5.87	B5	4 42 04.088	2.8831	- 3	- 8 34 50.28	6.682	0
173	Grb.848 Cam	6.04	F0	4 43 08.776	8.0959	+102	+75 52 06.82	6.455	-135
176	μ Eridani	4.18	B5	4 43 24.002	+3.0009	+ 9	- 3 19 48.62	+6.563	- 10
177	μ Mensæ	5.69	B9	4 43 28.512	-0.5921	+ 20	-71 00 30.04	6.602	+ 34
175	4 Camelopardi	5.35	A2	4 44 29.747	+5.0037	+ 65	+56 41 06.05	6.335	-145
1132	268 G. Eridani	5.97	A2	4 44 45.061	2.3964	+ 1	-28 09 44.29	6.477	+ 16
1133	Br. 658 Persei	5.10	K2	4 47 04.711	4.0413	- 30	+37 24 57.82	6.306	+ 39
1134	π^3 Orionis	3.31	F8	4 47 33.460	+3.2581	+312	+ 6 53 22.47	+6.246	+ 18
1135	97 Tauri	5.12	F0	4 48 54.841	3.5115	+ 57	+18 46 12.20	6.081	- 34
179	π^4 Orionis	3.78	B3	4 48 57.995	3.1966	- 2	+ 5 32 05.44	6.113	+ 3
178	α Camelopardi*	4.38	B0	4 49 51.564	5.9728	+ 3	+66 16 27.40	6.044	+ 9
1136	σ^1 Orionis	5.19	M0	4 50 09.208	3.3952	- 3	+14 10 56.08	5.955	- 56
180	π^5 Orionis	3.87	B3	4 52 03.666	+3.1261	- 3	+ 2 22 24.36	+5.855	+ 3
181	ϵ Aurigæ	2.90	K2	4 54 15.256	+3.9093	+ 3	+33 06 05.33	5.650	- 18
1138	η Mensæ	5.28	K0	4 56 22.772	-1.7154	+ 72	-75 00 08.36	5.552	+ 58
183	ϵ Aurigæ*	Var.	F5p	4 58 57.003	+4.3084	+ 4	+43 45 47.64	5.267	- 6
1137	ζ Aurigæ*	3.94	K0, B1	4 59 32.251	4.1964	+ 10	+41 00 59.64	5.202	- 22
182	β Camelopardi*	4.22	G0p	4 59 40.333	+5.3425	- 6	+60 23 00.49	+5.197	- 14
184	ϵ Tauri	4.70	A5	5 00 34.922	3.5877	+ 47	+21 31 54.24	5.095	- 40
1139	26 G. Cæli	6.00	K0	5 00 47.337	2.2707	- 8	-31 49 52.80	5.202	+ 83
1140	11 Orionis	4.65	B9	5 02 09.984	3.4297	+ 11	+15 20 50.06	4.968	- 34
185	η Aurigæ	3.28	B3	5 03 33.885	+4.2098	+ 27	+41 10 47.19	4.816	- 66
186	ξ Mensæ	5.85	K0	5 03 34.55	-6.810	- 3	-82 31 47.43	+4.900	+ 11
186	ϵ Leporis	3.29	K5	5 03 40.901	+2.5404	+ 18	-22 25 34.18	4.805	- 69
187	η^2 Pictoris	4.92	K5	5 03 52.537	1.5540	+ 55	-49 38 02.42	4.857	- 1
189	ζ Doradus	4.76	F8	5 04 47.229	1.0293	- 51	-57 31 46.35	4.899	+118
188	β Eridani	2.92	A3	5 05 46.975	2.9502	- 64	- 5 08 21.28	4.618	- 77
1143	13 G. Pictoris	7.10	A0	5 06 11.212	+1.7821	+ 25	-44 52 31.88	+4.687	+ 25
1142	16 Orionis	5.42	A2	5 07 00.855	3.3017	+ 41	+ 9 46 38.12	4.587	- 3
1141	B.D.+27° 732 Tau* p	5.97	A3	5 07 06.673	3.7688	+ 43	+27 58 43.94	4.515	- 66
190	λ Eridani	4.34	B2	5 07 08.080	2.8720	+ 1	- 8 48 23.52	4.577	- 3
192	μ Aurigæ	4.78	A3	5 10 32.005	4.1075	- 17	+38 26 12.07	4.210	- 78
1144	μ Leporis	3.30	A0p	5 11 02.591	+2.6956	+ 28	-16 15 14.18	+4.219	- 28
194	β Orionis*	0.34	B8p	5 12 31.073	2.8840	+ 2	- 8 14 55.50	4.120	- 1
193	α Aurigæ*	0.21	G0	5 13 34.950	+4.4348	+ 80	+45 57 27.16	3.606	-423
196	θ Doradus	4.78	K0	5 13 46.971	-0.0446	+ 10	-67 13 57.50	4.050	+ 35
195	τ Orionis	3.68	B5	5 15 33.917	+2.9139	- 11	- 6 53 18.10	3.852	- 8
191	19 H. Cam*	5.24	F8	5 15 35.815	+9.9106	-289	+79 11 15.91	+4.011	+159
197	σ Columbæ	4.91	K0	5 15 58.097	2.1641	+ 69	-34 56 06.96	3.487	-338
1145	λ Aurigæ	4.85	G0	5 16 10.992	+4.2224	+457	+40 03 49.78	+3.142	-663

No. 178: 9 Camelopardi.
 No. 183: 3^m.1 to 3^m.8.
 No. 1137: 4^m.9 to 5^m.6 (*Kopff*).
 No. 182: 10 Camelopardi.

No. 1141: 8^m.2, 12'', 27°.
 No. 194: *Rigel*.
 No. 193: *Capella*.
 No. 191: 8^m.7, 14'', 109°.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
N γ	B.D.+85° 74 Cep	6.54	A5	5 16 41.10	+21.423	+23	+85 54 10.83	+3.668	- 82
1146	λ Leporis	4.29	B1	5 17 38.322	2.7647	- 2	-13 13 07.58	3.680	- 2
198	12 G. Columbæ	5.75	A0	5 17 43.197	2.3928	+ 5	-27 24 38.81	3.671	- 4
199	ζ Pictoris	5.52	F8	5 18 20.125	1.4718	+ 10	-50 39 01.11	3.856	+234
1147	22 Orionis	4.65	B3	5 19 36.982	3.0636	- 2	- 0 25 20.80	3.510	- 1
201	γ Orionis*	1.70	B2	5 22 52.586	+ 3.2187	- 6	+ 6 18 47.48	+3.215	- 15
202	β Tauri	1.78	B8	5 23 38.066	3.7940	+ 20	+28 34 25.82	2.989	-176
1148	115 Tauri*	5.31	B3	5 24 42.942	3.5010	+ 4	+17 55 40.02	3.047	- 24
1149	18 G. Columbæ	5.85	A2	5 25 44.276	1.9250	- 8	-40 58 44.08	3.078	+ 95
203	17 Camelopardi	5.75	K5	5 26 11.762	5.6706	- 7	+63 02 06.00	2.939	- 2
204	β Leporis*	2.96	G0	5 26 26.682	+ 2.5716	+ 1	-20 47 30.19	+2.831	- 92
1150	18 Camelopardi	6.46	G0	5 28 57.685	5.1418	+145	+57 11 38.61	2.484	-218
1152	20 G. Pictoris	5.54	G5	5 29 00.068	1.6498	+14	-47 06 25.02	2.574	-127
206	δ Orionis	2.48	B0	5 29 51.548	3.0658	0	- 0 19 43.10	2.627	+ 1
1151	χ Aurigæ	4.88	B1	5 29 59.496	3.9065	0	+32 09 46.57	2.611	- 3
207	α Leporis	2.69	F0	5 30 52.582	+ 2.6468	+ 2	-17 51 03.60	+2.542	+ 4
208	φ ¹ Orionis	4.53	B0	5 32 30.769	3.2944	- 1	+ 9 27 45.99	2.393	- 2
212	β Doradus*	3.81	F5p	5 33 15.440	0.5213	- 11	-62 31 01.35	2.342	+ 9
209	ε Orionis*	2.89	Oe5	5 33 22.621	+ 2.9355	+ 1	- 5 56 09.33	2.325	+ 4
214	γ Mensæ	5.06	K0	5 33 32.228	- 2.3696	+312	-76 22 19.14	2.604	+294
210	ε Orionis	1.75	B0	5 34 04.838	+ 3.0450	0	- 1 13 37.89	+2.260	+ 1
205	Grb.966 Cam	6.36	K5	5 34 05.772	8.0334	- 20	+75 01 12.22	2.280	+ 26
211	ζ Tauri	3.00	B3p	5 35 07.955	3.5866	+ 1	+21 07 07.26	2.146	- 22
1153	35 G. Columbæ	6.75	K2	5 36 26.549	2.3902	+ 8	-27 14 02.48	2.045	- 10
215	α Columbæ	2.75	B5p	5 38 07.597	+ 2.1733	+ 2	-34 05 43.44	1.882	- 26
S ε	31 G. Mensæ	6.24	A0	5 38 17.98	-11.582	- 8	-84 48 42.63	+1.952	+ 49
C1	ζ ¹ Orionis*	2.05	B0	5 38 38.270	+ 3.0278	0	- 1 57 47.87	1.862	- 1
216	ο Aurigæ	5.52	A0	5 42 38.627	4.6496	- 10	+49 48 36.73	1.510	- 3
217	γ Leporis	3.80	F8	5 42 42.690	2.5020	-206	-22 27 38.98	1.138	-370
1154	δ Doradus	4.52	A5	5 44 41.773	0.1087	- 51	-65 45 04.43	1.344	+ 7
218	130 Tauri	5.51	F0	5 44 59.143	+ 3.4989	- 4	+17 42 54.25	+1.301	- 8
219	ζ Leporis	3.67	A2	5 45 03.059	2.7191	- 12	-14 50 10.80	1.299	- 5
220	κ Orionis	2.20	B0	5 45 45.796	2.8461	+ 2	- 9 40 59.39	1.238	- 4
1155	142 G. Orionis	5.95	G5	5 46 29.612	2.9814	+ 36	- 4 06 15.83	0.976	-202
N δ	Grb.944 Cephei	6.41	K0	5 48 05.44	18.900	+12	+85 10 36.61	1.030	+ 3
221	ν Aurigæ	4.18	K0	5 48 34.608	+ 4.1589	- 5	+39 08 17.73	+1.002	+ 7
1156	γ Pictoris	4.38	K0	5 49 03.707	1.0900	+ 83	-56 10 35.08	0.893	- 63
223	β Columbæ	3.22	K0	5 49 28.641	2.1154	+ 40	-35 46 58.86	1.323	+404
222	δ Leporis	3.90	K0	5 49 30.859	2.5809	+166	-20 52 52.95	0.266	-649
1159	37 G. Pictoris	4.98	K0	5 49 56.143	1.3581	+ 5	-52 07 04.30	0.799	- 79
1158	136 Tauri	4.54	A0	5 50 41.163	+ 3.7719	+ 4	+27 36 15.03	+0.797	- 14
S ζ	6 G. Octantis	6.74	K0	5 50 57.39	-15.700	-15	-85 55 45.36	0.806	+ 4
1157	ξ Aurigæ	4.92	A2	5 51 19.427	+ 5.0290	- 17	+55 41 58.99	+0.775	+ 20

No. 201: *Bellatrix*.
 No. 1148: 10^m.0, 10^s., 306°.
 No. 204: 7^m.5, 2^s., 339°.

No. 212: 4^m.2 to 5^m.7 (*Kopff*).
 No. 209: 7^m.3, 11^s., 142°.
 No. C1: 4^m.2 (♈), 2^s., 160°.

MEAN PLACES OF STARS, 1958.0
FOR JANUARY 0^d.861 UNIVERSAL TIME
(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
224	α Orionis*	Var.	M0	5 52 53.811	+3.2488	+ 19	+ 7 24 03.21	+0.630	+ 11
226	η Leporis	3.77	F0	5 54 29.436	2.7332	- 29	-14 10 26.56	0.617	+138
1160	γ Columbæ	4.36	B3	5 56 02.794	2.1278	- 2	-35 17 12.14	0.353	+ 9
225	δ Aurigæ	3.88	K0	5 56 04.051	4.9411	+ 96	+54 17 02.11	0.213	-127
227	β Aurigæ	2.07	A0p	5 56 26.802	4.4019	- 50	+44 56 43.28	0.305	- 2
1161	60 Orionis	5.25	A0	5 56 39.914	+3.0853	- 10	+ 0 33 02.17	+0.290	+ 1
228	θ Aurigæ*	2.72	A0p	5 56 51.359	4.0919	+ 40	+37 12 41.73	0.189	- 83
1162	B.D.+33° 1209 Aur	6.80	A2	5 57 28.631	3.9447	- 9	+33 08 09.08	0.224	+ 6
229	η Columbæ	4.03	K0	5 57 51.568	1.8368	+ 13	-42 48 59.94	+0.169	- 17
1163	1 Geminorum	4.30	G5	6 01 33.960	3.6475	- 4	+23 16 02.62	-0.243	-104
230	66 Orionis	5.70	K0	6 02 45.113	+3.1702	- 4	+ 4 09 45.30	-0.250	- 7
231	1 G. Puppis	6.22	F8	6 03 15.786	1.7270	- 87	-45 02 07.79	0.040	+247
1164	74 G. Columbæ	5.72	A0	6 04 28.427	2.3104	+ 6	-29 45 09.92	0.433	- 40
232	ν Orionis	4.40	B2	6 05 10.361	3.4260	+ 3	+14 46 30.58	0.478	- 23
1165	94 G. Leporis	5.46	A0	6 07 11.894	2.5233	+ 9	-22 25 06.98	0.667	- 36
233	36 Camelopardi	5.39	K0	6 08 37.575	+6.0358	+ 12	+65 43 47.48	-0.787	- 29
1166	ν Doradus	5.21	B9	6 09 00.485	-0.3844	- 95	-68 50 04.25	0.765	+ 23
235	δ Pictoris	4.84	B1	6 09 28.706	+1.1679	- 19	-54 57 30.72	0.816	+ 13
239	α Mensæ	5.14	K0	6 11 29.671	-1.7876	+302	-74 44 22.50	1.219	-216
1168	κ Aurigæ	4.45	K0	6 12 42.067	+3.8231	- 55	+29 30 55.46	1.378	-265
1167	Br. 904 Aurigæ* f.	6.42	F0	6 12 49.158	+4.0431	- 53	+36 09 47.58	-1.115	+ 8
1169	74 Orionis	5.11	F5	6 14 05.049	3.3693	+ 55	+12 17 07.90	1.047	+186
234	22 H. Cam	4.73	A0	6 14 13.258	6.6103	+ 8	+69 20 16.75	1.351	-103
238	κ Columbæ	4.51	K0	6 15 03.337	2.1342	- 14	-35 07 31.73	1.234	+ 84
237	2 Lynceis	4.42	A0	6 15 55.070	5.2931	- 12	+59 01 43.31	1.374	+ 20
1170	7 Monocerotis	5.13	B3	6 17 41.337	+2.8905	- 4	- 7 48 13.90	-1.547	+ 1
240	ζ Canis Majoris	3.10	B3	6 18 41.974	2.3037	+ 5	-30 02 36.68	1.630	+ 5
241	μ Geminorum	3.19	M0	6 20 25.138	3.6297	+ 40	+22 32 12.93	1.898	-113
243	β Canis Majoris	1.99	B1	6 20 50.940	2.6424	- 4	-17 56 01.76	1.826	- 4
244	ε Monocerotis*	4.48	A5	6 21 32.497	3.1796	- 12	+ 4 36 56.84	1.873	+ 11
242	ψ ¹ Aurigæ	5.10	K2	6 21 39.851	+4.6206	+ 1	+49 18 41.75	-1.900	- 5
1171	23 G. Canis Maj.	5.39	K0	6 22 12.719	2.7992	- 35	-11 30 22.26	1.982	- 40
245	α Carinæ*	-0.86	F0	6 23 01.130	1.3325	+ 24	-52 40 19.06	1.985	+ 25
1172	Grb.1156 Aurigæ	7.14	G5	6 23 22.292	4.2696	0	+41 59 05.30	2.054	- 11
246	10 Monocerotis	4.98	B3	6 25 53.050	2.9628	- 7	- 4 44 04.70	2.256	+ 4
1173	ν Geminorum	4.06	B5	6 26 28.128	+3.5624	- 5	+20 14 25.51	-2.330	- 18
1174	13 Monocerotis	4.50	A0p	6 30 37.919	3.2444	- 2	+ 7 21 55.10	2.680	- 7
1175	56 G. Mon	5.02	B3	6 31 29.905	3.0451	- 9	- 1 11 12.80	2.772	- 24
249	ξ Canis Majoris	4.54	A0	6 33 17.683	2.5147	+ 6	-22 55 49.06	2.889	+ 14
247	8 Lynceis	6.05	G0	6 33 51.328	5.4805	-290	+61 31 14.77	3.232	-278
251	γ Geminorum	1.93	A0	6 35 17.130	+3.4659	+ 30	+16 26 12.53	-3.120	- 44
250	51 Aurigæ	5.71	K0	6 35 44.939	4.1565	- 22	+39 25 47.37	3.231	-115
252	ν Puppis*	3.18	B8	6 36 28.474	+1.8357	- 7	-43 09 29.14	-3.179	- 1

No. 224: *Betelgeuse*. 0^m.1 to 1^m.2.
No. 228: 7^m.5, 3^o.0, 320°.
No. 1167: 7^m.0, 11^o.7, 217°.

No. 244: 8 Monocerotis. 6^m.5, 13^o.7, 27°.
No. 245: α Argus, *Canopus*.
No. 252: ν Argus.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
248	23 H. Cam	5.60	F8	6 39 06.203	+10.2252	-323	+79 36 54.53	-4.018	- 607
254	ε Geminorum . . .	3.18	G5	6 41 20.886	3.6907	- 5	+25 10 28.16	3.614	- 15
256	ξ Geminorum . . .	3.40	F5	6 42 55.902	3.3670	- 81	+12 56 32.96	3.930	- 195
257	α C Ma* c. g . . .	-1.58	A0	6 43 17.875	+ 2.6433	-375	-16 39 26.06	4.976	-1210
264	ζ Mensæ	5.64	A2	6 43 34.687	- 5.0049	- 21	-80 46 18.04	3.726	+ 59
255	ψ ^δ Aurigæ	5.34	G0	6 43 42.798	+ 4.3235	- 1	+43 37 16.81	-3.640	+ 162
1177	16 Monocerotis . .	5.84	B3	6 44 14.939	3.2718	- 7	+ 8 37 59.52	3.866	- 8
1176	ψ ^δ Aurigæ	5.28	K0	6 44 27.564	4.5725	- 4	+48 50 10.01	3.862	+ 5
258	18 Monocerotis . .	4.70	K0	6 45 40.198	3.1282	- 14	+ 2 27 34.72	3.983	- 13
1178	31 G. Puppis . . .	5.25	B9	6 45 55.027	2.0529	- 19	-37 52 56.39	4.006	- 16
1179	80 G. Mon	5.65	A0	6 47 09.420	+ 3.0216	- 11	- 2 13 22.94	-4.092	+ 5
262	α Pictoris	3.30	A5	6 47 45.621	0.6149	-107	-61 53 45.13	3.878	+ 269
1180	κ Canis Majoris . .	3.78	B2p	6 48 16.244	2.2414	- 10	-32 27 31.83	4.187	+ 4
263	τ Puppis*	2.83	K0	6 48 53.549	1.4883	+ 26	-50 33 49.82	4.317	- 73
259	43 Camelopardi . .	5.13	B5	6 49 11.136	6.4637	+ 2	+68 56 24.84	4.269	+ 4
261	θ Geminorum . . .	3.64	A2	6 50 01.303	+ 3.9536	- 1	+34 00 49.60	-4.394	- 52
267	ι Volantis	5.52	B8	6 51 56.131	- 0.6899	- 9	-70 54 41.23	4.483	+ 20
266	θ Canis Majoris . .	4.25	K2	6 52 14.258	+ 2.7876	- 95	-11 59 04.80	4.545	- 14
260	24 H. Cam	4.75	K5	6 53 58.207	8.7371	+209	+77 02 06.64	4.694	- 12
268	ε Canis Majoris . .	1.63	B1	6 56 58.465	2.3585	+ 4	-28 54 49.56	4.981	+ 2
1181	101 G. Mon	5.84	A0	6 58 22.579	+ 2.8822	- 15	- 8 20 49.45	-5.062	- 10
1182	ω Geminorum . . .	5.21	K0	6 59 51.266	3.6549	-7	+24 16 37.36	5.181	- 3
1183	σ Canis Majoris . .	3.68	K5	7 00 02.708	2.3905	- 4	-27 52 24.82	5.191	+ 1
270	ο ² Canis Majoris . .	3.12	B5p	7 01 16.194	2.5057	- 1	-23 46 14.64	5.295	+ 2
269	ζ Geminorum* . . .	Var.	G0p	7 01 37.090	3.5577	- 7	+20 38 01.00	5.329	- 3
271	γ Canis Majoris . .	4.07	B5	7 01 51.449	+ 2.7148	+ 1	-15 34 11.57	-5.355	- 9
S η	7 G. Octantis . . .	6.41	F2	7 02 10.22	-21.245	+10	-86 58 11.35	5.353	+ 3
1184	C Puppis	5.26	A2	7 02 42.795	+ 1.9019	- 20	-42 16 27.59	5.350	+ 67
272	27 G. Carinæ . . .	5.30	A0	7 03 31.286	1.1169	- 12	-56 41 07.27	5.483	+ 2
1185	2 G. Canis Min. . .	5.92	K0	7 05 33.206	+ 3.2428	- 3	+ 7 32 19.26	5.693	- 36
S θ	A Octantis	7.75	A0	7 05 44.89	-53.333	- 7	-88 41 48.54	-5.619	+ 15
273	δ Canis Majoris . .	1.98	F8p	7 06 40.959	+ 2.4398	- 3	-26 19 31.13	5.746	+ 5
1186	20 Monocerotis . .	5.02	K0	7 08 08.477	2.9802	- 1	- 4 10 12.43	5.658	+ 215
274	63 Aurigæ	5.07	K2	7 08 46 113	+ 4.1251	+ 36	+39 23 27.42	5.929	- 2
1189	γ ² Volantis*	3.87	K0	7 09 06.697	- 0.5114	+ 45	-70 25 51.75	5.854	+ 98
1187	δ Monocerotis* . .	4.09	A0	7 09 43.130	+ 3.0637	- 3	- 0 25 18.20	-5.999	+ 6
1188	51 Geminorum . . .	5.31	M3	7 10 57.573	3.4445	+ 6	+16 13 54.68	6.153	- 44
275	I Puppis	4.47	F0	7 11 21.689	1.7101	-141	-46 41 18.29	6.043	+ 98
1190	Grb.1281 Lyncis . .	5.55	G0	7 12 43.265	4.4533	+ 35	+47 18 59.88	6.440	- 184
276	64 Aurigæ	5.75	A3	7 15 07.131	4.1698	- 16	+40 57 35.81	6.444	+ 11
278	π Puppis*	2.74	K5	7 15 39.513	+ 2.1194	- 8	-37 01 15.29	-6.489	+ 9
277	λ Geminorum . . .	3.65	A2	7 15 40.773	+ 3.4471	- 36	+16 37 03.99	6.539	- 39
281	δ Volantis	4.02	F5	7 16 51.410	- 0.0321	- 12	-67 52 49.38	-6.597	- 2

No. 257: *Sirius*. -1^m.58 and 8^m.44, 8'', 95°.No. 263: τ *Argus*.No. 269: 3^m.7 to 4^m.1.No. 1189: 5^m.8, 14'', 299°.No. 1187: 22 *Monocerotis*.No. 278: π *Argus*.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
279	δ Geminorum*	3.52	F0	7 17 36.928	+ 3.5822	- 19	+22 03 40.86	-6.675	- 14
280	19 Lynceis*f.	5.61	B8	7 19 26.803	4.8915	- 8	+55 21 46.03	6.847	- 35
1191	66 Aurigæ	5.28	K0	7 21 14.143	4.1527	- 5	+40 45 18.40	6.988	- 29
Nd	51 H. Cephei	5.26	M0	7 21 34.53	27.824	-48	+87 06 39.60	7.036	- 33
283	η Canis Majoris	2.43	B5p	7 22 25.960	2.3734	- 5	-29 13 12.17	7.050	+ 6
282	ι Geminorum	3.89	K0	7 23 07.178	+ 3.7251	- 92	+27 52 59.76	-7.202	- 89
1192	169 G. Canis Maj.	5.82	F0	7 23 12.525	2.7555	-142	-13 40 05.08	7.130	- 11
285	β Canis Minoris	3.09	B8	7 24 52.379	3.2530	- 38	+ 8 22 31.71	7.296	- 40
286	ρ Geminorum	4.18	F0	7 26 24.704	3.8573	+116	+31 52 10.96	7.210	+ 172
284	Grb.1308 Cam	5.80	K0	7 26 31.563	6.2326	- 22	+68 33 15.65	7.432	- 40
1193	6 Canis Minoris	4.85	K0	7 27 27.533	+ 3.3390	- 2	+12 05 42.13	-7.483	- 17
1194	σ Puppis*	3.28	K5	7 27 53.818	1.9035	- 57	-43 12 55.56	7.311	+ 190
287	α Gem*c. g.	1.58	A0	7 31 55.292	3.8276	-138	+31 58 56.11	7.930	- 103
288	108 G. Puppis	4.52	F8	7 32 15.189	2.5678	- 38	-22 12 15.63	7.818	+ 35
1196	ν Geminorum	4.22	K5	7 33 20.169	3.6956	- 26	+26 59 26.72	8.050	- 110
1195	B.D.+46° 1286 Lyn.	5.80	K5	7 33 28.965	+ 4.3527	- 29	+46 16 29.23	-7.982	- 39
1198	Q Carinæ	4.92	K5	7 34 37.340	1.4834	+ 15	-52 26 22.08	8.064	- 21
1197	125 G. Puppis	5.66	B3	7 34 50.228	2.6372	- 4	-19 36 27.07	8.057	+ 3
289	25 Monocerotis	5.17	F5	7 35 11.348	2.9825	- 51	- 4 00 57.08	8.073	+ 16
290	127 G. Puppis*	4.62	B8	7 35 48.747	2.2198	- 27	-34 52 22.43	8.120	+ 18
291	α C. Mi*c. g.	0.48	F5	7 37 06.231	+ 3.1397	-475	+ 5 20 02.58	-9.271	-1029
293	α Monocerotis*	4.07	K0	7 39 14.399	2.8664	- 51	- 9 27 06.90	8.436	- 24
292	24 Lynceis	4.96	A2	7 39 27.784	5.0704	- 53	+58 48 39.33	8.484	- 54
294	κ Geminorum*	3.70	G5	7 41 54.830	+ 3.6208	- 23	+24 30 01.34	8.677	- 53
297	ζ Volantis	3.89	K0	7 42 21.020	- 0.7444	+ 59	-72 30 19.73	8.638	+ 18
295	β Geminorum*	1.21	K0	7 42 44.878	+ 3.6696	-474	+28 07 45.31	-8.741	- 52
1200	81 Geminorum	5.02	K2	7 43 41.613	3.4727	- 54	+18 36 50.51	8.825	- 61
1199	B.D.+37° 1769 Lyn.	5.45	M0	7 43 51.287	4.0007	+ 15	+37 37 14.87	8.770	+ 7
1201	11 Canis Minoris	5.30	A0	7 43 57.512	3.3018	- 22	+10 52 19.54	8.809	- 24
1202	4 Puppis	5.11	F0	7 44 00.773	2.7627	- 10	-14 27 37.75	8.785	+ 4
296	π Geminorum	5.29	K2	7 44 48.068	+ 3.8665	- 9	+33 31 13.77	-8.882	- 31
1203	187 G. Puppis	5.26	B2	7 46 15.284	1.8126	- 13	-46 30 12.28	8.960	+ 4
1204	ξ Puppis*	3.47	G0p	7 47 31.612	2.5236	- 3	-24 45 11.68	9.067	- 4
1206	61 G. Carinæ	5.82	F2	7 48 31.264	0.9894	- 95	-60 10 42.38	8.989	+ 151
1205	ζ Canis Minoris	5.11	B8	7 49 31.279	3.1108	- 15	+ 1 52 31.57	9.224	- 5
301	213 G. Puppis*	3.76	G5	7 50 46.284	+ 2.0621	- 21	-40 27 59.60	-9.315	+ 1
1207	φ Geminorum	4.99	A2	7 50 55.717	3.6700	- 28	+26 52 33.90	9.363	- 35
299	26 Lynceis	5.69	K0	7 51 39.562	4.3646	- 50	+47 40 31.44	9.387	- 2
1208	1 Caneri	5.96	K0	7 54 36.416	3.4052	- 23	+15 54 14.09	9.657	- 45
300	Grb.1374 Cam	5.56	K0	7 55 12.422	7.1617	- 30	+74 01 59.94	9.695	- 34
1209	Grb.1384 Lynceis	6.47	K0	7 55 19.894	+ 4.2110	+ 38	+44 05 29.22	-9.660	+ 8
303	χ Carinæ*	3.60	B3	7 55 42.599	+ 1.5248	- 41	-52 52 07.74	-9.666	+ 29

No. 279: 8^m.5, 7^{''}, 218°.No. 280: 6^m.5, 15^{''}, 315°.

No. 1194: σ Argus.

No. 287: Castor, 1^m.99 and 2^m.85, 2^{''}.1, 169°.

No. 290: f Puppis.

No. 291: Procyon. 0^m.5 and 13^m.5, 4^{''}.0, 87°.

No. 293: 26 Monocerotis.

No. 294: 8^m.5, 7^{''}, 237°.

No. 295: Pollux.

No. 1204: ξ Argus.

No. 301: α Puppis.

No. 303: χ Argus.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^{''} .0001)	° ' "	"	(0 ^{''} .001)
1210	225 G. Puppis . . .	4.85	A2	7 55 59.590	+ 2.3921	- 6	-30 13 13.89	- 9.712	+ 6
304	27 Monocerotis . . .	5.06	K0	7 57 38.206	2.9966	- 43	- 3 33 49.47	9.845	- 1
1212	232 G. Puppis . . .	4.64	A2	7 57 59.032	2.6885	- 7	-18 16 58.70	9.920	- 50
302	53 Camelopardi . . .	6.00	A2 _p	7 58 07.838	5.1156	- 74	+60 26 29.19	9.904	- 22
1211	ω Cancri	5.88	K0	7 58 23.505	3.6285	+ 8	+25 30 33.45	9.901	0
1213	161 G. Mon	6.30	G0	8 00 22.145	+ 2.9481	+ 7	- 6 13 08.50	-10.079	- 28
305	χ Geminorum . . .	5.04	K0	8 00 56.460	3.6828	- 21	+27 54 49.05	10.141	- 46
306	ζ Puppis*	2.27	Od	8 02 06.399	2.1087	- 30	-39 53 01.85	10.168	+ 14
307	27 Lynceis	4.87	A2	8 05 18.363	4.5080	- 67	+51 37 46.59	10.432	- 9
308	ρ Puppis*	2.88	F5	8 05 45.269	2.5555	- 60	-24 10 55.31	10.404	+ 51
N ε	Grb.1359 Cam	6.39	A0	8 07 07.88	+14.212	- 8	+84 11 06.83	-10.587	- 22
1214	Pi. 7 ^h 308 Lynceis . .	6.64	F8	8 07 27.668	3.9015	+163	+35 34 57.21	10.820	-237
309	γ Velorum*	1.92	Oa _p	8 08 14.247	1.8493	- 8	-47 12 43.18	10.634	+ 5
1215	3 H. Ursæ Maj	5.48	G5	8 08 39.473	5.9585	- 4	+68 36 00.93	10.666	+ 7
311	20 Puppis*	5.05	G5	8 11 24.077	2.7675	- 12	-15 39 37.87	10.879	- 6
312	β Cancri	3.76	K2	8 14 14.296	+ 3.2527	- 34	+ 9 18 58.85	-11.132	- 51
310	Br. 1147 Cam	5.73	G5	8 14 18.970	7.5065	+ 65	+75 53 17.73	11.074	+ 15
1216	B.D.+4° 1945 Hya . .	6.68	G0, A2	8 15 05.888	3.1580	+ 1	+ 4 20 59.93	11.143	+ 1
313	289 G. Puppis*	4.43	A5	8 16 58.897	2.2459	- 94	-36 31 41.66	11.188	+ 91
1218	7 G. Hydræ	6.32	A5	8 17 14.210	2.8738	- 43	-10 02 01.12	11.270	+ 29
1217	χ Cancri	5.16	F5	8 17 30.947	+ 3.6424	- 15	+27 21 18.38	-11.705	-386
1219	294 G. Puppis	4.94	K0	8 19 43.682	2.3629	- 13	-32 55 10.89	11.469	+ 9
314	31 Lynceis	4.43	K5	8 19 57.998	4.1041	- 16	+43 19 28.07	11.600	-104
1220	20 Cancri	5.88	F0	8 20 57.632	3.4338	- 40	+18 28 06.50	11.596	- 30
315	ε Carinæ*	1.74	K0, B	8 21 39.203	+ 1.2303	- 37	-59 22 25.47	11.596	+ 18
318	θ Chamæleontis . . .	4.26	K0	8 21 56.442	- 1.8133	-387	-77 20 58.72	-11.594	+ 39
1221	302 G. Puppis* p . . .	5.55	K5	8 23 14.859	+ 2.5909	- 22	-23 54 31.93	11.702	+ 27
316	Br. 1197 Hydræ	3.95	A0	8 23 33.701	2.9975	- 46	- 3 46 05.51	11.777	- 26
319	β Volantis	3.65	K0	8 25 17.213	0.6513	- 44	-65 59 47.07	12.031	-160
1222	29 Cancri	5.90	A2	8 26 16.781	3.3466	- 13	+14 21 04.22	11.959	- 16
317	ο Ursæ Majoris	3.47	G0	8 26 47.443	+ 4.9762	-185	+60 51 38.01	-12.091	-111
320	Grb.1450 Lynceis . . .	6.05	K0	8 30 11.475	3.8971	- 86	+38 09 43.08	12.389	-173
321	η Cancri	5.52	K0	8 30 16.898	3.4676	- 35	+20 35 06.60	12.272	- 49
322	Grb.1446 Cam	6.29	K0	8 35 05.029	6.6479	- 51	+73 46 44.56	12.658	-104
1223	δ Hydræ	4.18	A0	8 35 25.994	3.1753	- 47	+ 5 51 05.03	12.587	- 11
324	48 G. Velorum*	4.13	A5	8 36 09.912	+ 2.1094	- 17	-42 50 28.55	-12.618	+ 7
323	Grb.1460 U Ma	6.03	K0	8 36 11.486	4.4394	- 39	+52 51 37.51	12.665	- 36
1224	σ Hydræ	4.54	K0	8 36 33.756	3.1353	- 13	+ 3 29 24.18	12.674	- 21
325	6 Hydræ	5.15	K2	8 38 02.010	2.8421	- 60	-12 19 33.02	12.758	- 6
1225	34 Lynceis	5.52	K0	8 38 07.353	4.1418	+ 21	+45 58 58.22	12.674	+ 85
1227	ο Velorum*	3.68	B3	8 39 05.394	+ 1.7196	- 22	-52 46 19.28	-12.801	+ 22
1226	53 G. Velorum	4.06	F5 _p	8 39 13.883	+ 1.9913	- 6	-46 29 54.43	-12.828	+ 4

No. 306: ζ Argus.
 No. 308: ι Navis.
 No. 309: γ Argus. 4^m.8, 41'', 220°.
 No. 311: 20 Navis.
 No. 313: q Puppis.

No. 315: ε Argus.
 No. 1221: 7^m.9, 41'', 87°.
 No. 324: e Velorum.
 No. 1227: ο Argus.

MEAN PLACES OF STARS, 1958.0

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
1228	γ Cancri	4.73	A0	8 40 51.466	+ 3.4701	- 76	+21 37 15.01	-12.986	- 44
327	α Pyxidis	3.70	B2	8 41 54.182	2.4113	- 13	-33 02 02.43	13.002	+ 9
326	δ Cancri	4.17	K0	8 42 18.006	+ 3.4077	- 15	+18 18 35.76	13.271	-233
331	η Chamæleontis	5.62	B9	8 42 48.288	- 2.0568	- 78	-78 48 42.20	13.048	+ 21
1229	25 G. Pyxidis	6.13	A2	8 43 02.490	+ 2.6850	+ 4	-21 00 50.86	13.062	+ 25
330	δ Velorum* <i>m.</i>	2.01	A0	8 43 32.621	+ 1.6567	+ 22	-54 33 13.55	-13.195	- 76
328	ϵ Cancri*	4.20	G5	8 44 09.547	3.6281	- 19	+28 54 53.73	13.206	- 45
329	ϵ Hydræ <i>m.</i>	3.48	F8	8 44 33.166	3.1764	-130	+ 6 34 26.61	13.241	- 54
1230	14 Hydræ	5.19	B9	8 47 15.059	3.0144	- 18	- 3 17 09.67	13.386	- 23
332	γ Pyxidis	4.19	K2	8 48 44.883	2.5468	-101	-27 33 11.55	13.380	+ 81
334	ζ Hydræ	3.30	K0	8 53 10.454	+ 3.1705	- 69	+ 6 06 23.45	-13.735	+ 10
1231	80 G. Hydræ*	5.90	K0	8 53 16.612	2.7584	+ 23	-18 04 49.49	13.770	- 19
336	108 G. Carinæ*	3.98	B8	8 54 05.834	1.3597	- 25	-60 29 00.80	13.761	+ 42
1233	109 G. Carinæ*	5.29	B3	8 55 56.749	1.4673	- 20	-59 03 59.30	13.908	+ 12
337	α Cancri	4.27	A3	8 56 11.489	3.2800	+ 22	+12 01 17.40	13.970	- 34
335	ι Ursæ Majoris*	3.12	A5	8 56 20.458	+ 4.1026	-443	+48 12 28.47	-14.186	-240
1232	64 Cancri	5.64	G5	8 56 58.160	3.6813	- 37	+32 34 58.79	14.025	- 40
339	Br. 1268 Lyncis*	4.09	F5	8 57 55.207	3.8906	-395	+41 57 01.29	14.301	-257
1234	91 G. Velorum	4.42	F8	8 58 31.219	2.2402	- 40	-41 05 21.86	14.042	+ 39
338	ρ Ursæ Majoris	4.99	M0	8 58 47.129	5.3950	- 45	+67 47 42.70	14.084	+ 16
1235	92 G. Hydræ	5.80	K0	8 59 49.222	+ 3.0645	- 37	- 0 19 02.44	-14.086	+ 76
341	κ Ursæ Majoris*	3.68	A0	9 00 45.994	4.0910	- 35	+47 19 26.70	14.279	- 58
340	Grb.1501 U Ma	5.68	A2	9 00 56.443	4.3885	- 14	+54 27 03.31	14.233	- 1
1236	93 G. Hydræ	6.74	A0	9 01 37.832	2.9902	- 11	- 5 00 14.69	14.269	+ 5
343	α Volantis	4.18	A5	9 01 47.383	0.9462	+ 11	-66 13 41.11	14.384	-101
342	97 G. Velorum*	3.69	K0	9 02 42.210	+ 2.0690	- 57	-46 55 47.15	-14.354	- 15
<i>S c</i>	ζ Octantis	5.38	F0	9 03 10.78	- 8.860	-92	-85 29 52.85	14.325	+ 37
1237	Pi. 8 ^h 245 Lyncis	4.71	G5	9 03 51.812	+ 3.8125	- 27	+38 37 16.84	14.433	- 22
1238	κ Cancri	5.14	B8	9 05 28.394	3.2482	- 17	+10 50 18.18	14.518	- 10
345	λ Velorum*	2.22	K5	9 06 26.937	2.2072	- 25	-43 15 43.68	14.551	+ 15
<i>N z</i>	B.D.+84° 196 Cam	6.26	F0	9 06 55.68	+12.347	+18	+84 21 14.18	-14.591	+ 8
1239	ξ Cancri	5.22	G5	9 06 56.815	3.4474	0	+22 12 59.24	14.597	- 1
1240	101 G. Hydræ	5.81	K0	9 07 10.600	2.8766	+ 8	-12 11 12.41	14.625	- 15
1241	ϵ Pyxidis*	5.63	A3	9 08 09.524	2.5436	0	-30 11 34.64	14.713	- 45
1242	107 G. Hydræ	5.81	K0	9 10 03.244	2.7486	- 39	-19 34 30.72	14.746	+ 35
346	36 Lyncis	5.30	B8	9 11 03.830	+ 3.9195	- 27	+43 23 31.92	-14.880	- 38
347	θ Hydræ	3.84	A0	9 12 10.789	3.1209	+ 86	+ 2 29 32.89	15.220	-314
348	β Carinæ*	1.80	A0	9 12 44.964	0.6571	-280	-69 32 38.20	14.835	+103
351	ι Carinæ*	2.25	F0	9 15 57.965	1.6063	- 23	-59 05 54.53	15.119	+ 5
350	83 Cancri	6.60	F5	9 16 38.332	3.3466	- 87	+17 53 03.91	15.299	-135
352	α Lyncis*	3.30	K5	9 18 30.089	+ 3.6516	-181	+34 34 16.66	-15.257	+ 13
1243	θ Pyxidis	4.93	M0	9 19 37.935	+ 2.6570	- 7	-25 47 08.90	-15.343	- 10

No. 330: 2^m.1 and 5^m.2, 2^o.8, 154°.No. 328: 6^m.6, 31^o, 307°.No. 1231: 6^m.3, 67^o, 149°.No. 336: ϵ Carinæ.No. 1233: 7^m.0, 40^o, 75°.No. 335: 8^m.8, 6^o, 19°.No. 339: 10 Ursæ Majoris, 6^m.2, about 0^o.7.No. 341: 4^m.3 and 4^m.5, less than 0^o.3.No. 342: ϵ Velorum.No. 345: λ Argus.No. 1241: 9^m.4, 18^o, 147°.No. 348: β Argus.No. 351: ϵ Argus.

No. 352: 40 Lyncis.

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(The Annual Variations are for the middle of the year)

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				h m s	s	(0".0001)	° ' "	"	(0".001)
353	κ Velorum* . . .	2.63	B3	9 20 48.701	+1.8585	- 12	-54 49 50.23	-15.390	+ 10
1244	κ Leonis* . . .	4.61	K0	9 22 12.715	3.4916	- 25	+26 21 51.25	15.528	- 49
1245	28 Hydræ . . .	5.81	K5	9 23 18.001	2.9994	- 11	- 4 56 07.46	15.552	- 14
354	α Hydræ . . .	2.16	K2	9 25 31.381	2.9481	- 10	- 8 28 32.52	15.634	+ 27
356	ϵ Antliæ . . .	4.64	K2	9 27 30.564	2.4771	- 22	-35 46 01.09	15.777	- 10
355	23 Ursæ Majoris* .	3.75	F0	9 28 14.311	+4.7181	+ 155	+63 14 48.99	-15.783	+ 25
1246	ξ Leonis . . .	5.12	G5	9 29 40.987	3.2323	- 66	+11 29 12.33	15.971	- 87
361	N Velorum* . . .	3.04	K5	9 29 56.653	1.8235	- 42	-56 50 54.50	15.896	+ 2
358	θ Ursæ Majoris .	3.26	F8 p	9 30 03.544	4.0060	-1030	+51 52 11.65	16.447	-541
357	24 Ursæ Majoris* .	4.57	G0	9 30 48.124	5.2857	- 134	+70 00 59.63	15.870	+ 75
<i>N e</i>	1 H. Draconis . .	4.58	K2	9 31 15.52	+8.476	- 7	+81 30 52.64	-15.989	- 18
1247	160 G. Hydræ . . .	5.16	K0	9 31 16.319	2.7628	- 18	-20 55 44.39	15.958	+ 11
362	H Carinæ . . .	5.52	K2	9 31 18.317	0.4465	- 32	-72 53 40.34	15.978	- 8
360	10 Leonis Min. . .	4.62	G5	9 31 39.349	3.6717	+ 4	+36 35 06.20	16.019	- 29
1248	17 G. Antliæ . . .	5.63	K0	9 35 21.298	2.5837	+ 27	-31 59 20.78	16.207	- 24
1249	Br. 1352 Hydræ . .	4.78	K0	9 36 15.893	+3.1290	- 108	+ 4 50 23.49	-16.284	- 55
1250	ι Hydræ . . .	4.10	K0	9 37 42.662	3.0636	+ 31	- 0 57 04.66	16.372	- 69
364	κ Hydræ . . .	4.96	B3	9 38 17.484	2.8763	- 20	-14 08 27.37	16.356	- 24
363	Grb.1564 U Ma . .	5.74	K0	9 38 41.030	5.1174	- 141	+69 25 48.44	16.427	- 74
365	$\circ$ Leonis . . .	3.76	F5, A3	9 38 54.616	3.2008	- 98	+10 05 03.58	16.403	- 39
1251	15 Leonis . . .	5.73	A2	9 41 05.763	+3.5139	- 18	+30 10 06.38	-16.583	-109
1252	ψ Leonis . . .	5.62	M0	9 41 26.753	3.2656	- 1	+14 12 53.35	16.495	- 4
366	θ Antliæ . . .	4.98	F5 p	9 42 19.638	2.6752	- 38	-27 34 35.23	16.504	+ 30
367	ϵ Leonis . . .	3.12	G0 p	9 43 28.222	3.4032	- 34	+23 58 06.76	16.607	- 16
1253	B.D.+19°2254 Leo .	6.92	K0	9 43 32.099	3.3312	+ 16	+18 52 40.53	16.613	- 19
1254	l Carinæ* . . .	Var.	G0	9 44 05.559	+1.6485	- 18	-62 18 48.63	-16.607	+ 13
1255	Br. 1369 U Ma . .	5.20	G0	9 45 53.368	3.8647	+ 215	+46 13 03.77	16.806	- 97
368	ν Ursæ Majoris .	3.89	F0	9 48 01.160	4.2569	- 385	+59 14 14.71	16.967	-156
370	6 Sextantis . . .	6.00	A2	9 49 07.002	3.0228	+ 5	- 4 02 44.61	16.895	- 33
1256	162 G. Velorum . .	5.72	K0	9 49 42.081	2.3258	- 29	-45 59 48.00	16.855	+ 35
371	μ Leonis . . .	4.10	K0	9 50 22.709	+3.4096	- 162	+26 12 20.31	-16.982	- 60
373	183 G. Hydræ . . .	5.16	M0	9 52 53.260	2.8307	- 31	-18 48 34.98	17.086	- 47
1257	18 G. Sextantis . .	7.03	K0	9 54 02.719	2.9802	- 20	- 7 26 43.83	17.098	- 6
372	Grb.1586 U Ma . .	5.96	K0	9 54 40.252	5.3381	- 183	+73 04 49.86	17.164	- 43
374	19 Leonis Min. . .	5.19	F5	9 55 07.127	3.6701	- 107	+41 15 23.57	17.171	- 30
375	ϕ Velorum* . . .	3.70	B5	9 55 23.084	+2.1075	- 16	-54 22 01.54	-17.142	+ 11
377	η Antliæ . . .	5.25	F0	9 57 03.936	2.5749	- 81	-35 41 21.53	17.253	- 25
376	12 Sextantis . . .	6.63	A5	9 57 32.356	3.1111	- 49	+ 3 35 10.71	17.231	+ 18
378	π Leonis . . .	4.89	M0	9 57 59.689	3.1694	- 23	+ 8 14 47.42	17.296	- 27
1258	20 Leonis Min. . .	5.60	G5	9 58 35.675	3.4560	- 414	+32 07 51.91	17.730	-433
1259	Pi. 9 ^h 229 U Ma . .	5.74	F5	10 01 49.602	+3.9803	- 28	+54 05 44.89	-17.448	- 10
1260	193 G. Hydræ . . .	5.80	F0	10 02 24.501	2.7733	- 71	-24 04 53.66	17.442	+ 20
1261	ν^2 Hydræ . . .	4.72	B8	10 03 04.679	+2.9218	- 26	-12 51 37.38	-17.483	+ 8

No. 353: κ Argus.
 No. 1244: 9^m.8, 3^s., 208°.
 No. 355: h Ursæ Majoris.
 No. 361: possibly variable.

No. 357: d Ursæ Majoris.
 No. 1254: 3^m.6 to 4^m.8.
 No. 375: ϕ Argus.

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				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
379	η Leonis	3.58	A0p	10 05 02.679	+3.2690	- 4	+16 58 05.57	-17.580	- 6
380	α Leonis*	1.34	B8	10 06 08.207	3.1938	-169	+12 10 23.62	17.617	+ 3
381	λ Hydræ	3.83	K0	10 08 32.356	2.9253	-138	-12 08 44.89	17.812	- 93
385	ω Carinæ*	3.56	B8	10 12 44.552	1.4281	- 45	-69 49 44.42	17.885	+ 2
382	191 G. Velorum* . .	4.09	A2	10 12 58.137	2.5198	-137	-41 54 47.84	17.856	+ 40
384	ζ Leonis	3.65	F0	10 14 21.429	+3.3344	+ 11	+23 37 38.30	-17.963	- 12
383	λ Ursæ Majoris . .	3.52	A2	10 14 34.269	3.6136	-152	+43 07 29.50	18.004	- 45
1262	32 Ursæ Majoris . .	5.74	A3	10 15 00.416	4.3443	-144	+65 19 07.70	17.990	- 13
1263	ϵ Sextantis	5.40	F0	10 15 32.511	2.9813	-109	- 7 51 30.56	17.996	+ 1
1264	187 G. Carinæ . . .	3.44	K5	10 15 40.630	2.0052	- 32	-61 07 18.85	17.997	+ 5
1265	59 G. Antliæ	5.62	B9	10 16 11.894	+2.7509	- 14	-28 46 52.95	-18.012	+ 10
	C2 γ^1 Leonis*	2.61	K0	10 17 39.568	3.3057	+217	+20 03 16.82	18.232	-154
1266	23 Sextantis	6.53	B3	10 18 51.866	3.0976	- 8	+ 2 30 05.96	18.127	- 4
386	μ Ursæ Majoris . .	3.21	K5	10 19 50.038	3.5699	- 74	+41 42 41.27	18.130	+ 29
1268	204 G. Velorum . . .	4.99	K5	10 20 31.243	2.5746	- 28	-41 26 17.13	18.132	+ 53
1267	27 Leonis Min. . . .	5.83	A3	10 20 41.497	+3.4525	- 10	+34 07 14.94	-18.205	- 14
387	30 H. Ursæ Maj. . .	4.92	A0	10 21 07.530	4.3125	- 24	+65 46 46.72	18.232	- 25
388	25 Sextantis	6.10	B9	10 21 19.050	3.0320	- 37	- 3 51 40.12	18.213	0
1269	64 G. Antliæ	5.40	A3	10 21 38.722	2.6286	-137	-37 47 45.75	18.279	- 54
391	I Carinæ	4.08	F5	10 23 34.069	1.1897	- 30	-73 49 03.12	18.320	- 26
389	μ Hydræ	4.06	K5	10 24 03.436	+2.9024	- 89	-16 37 16.67	-18.395	- 83
392	α Antliæ	4.42	K5	10 25 13.620	2.7470	- 57	-30 51 11.58	18.338	+ 15
390	β Leonis Min.* . . .	4.41	K0	10 25 27.613	3.4656	-102	+36 55 23.01	18.471	-109
Nf	30 H. Cam	5.34	F2	10 26 07.96	7.222	-44	+82 46 25.28	18.361	+ 25
393	196 G. Carinæ* . . .	4.08	F0	10 26 19.931	2.2041	- 20	-58 31 28.20	18.397	- 5
1270	δ Sextantis	5.24	B9	10 27 20.672	+3.0468	- 35	- 2 31 24.75	-18.446	- 19
1271	B.D.+29°2057 L Mi.	6.92	K0	10 27 32.621	3.3623	+ 7	+28 47 48.06	18.442	- 8
394	36 Ursæ Majoris . .	4.84	F5	10 27 57.095	3.8314	-218	+56 11 47.92	18.483	- 35
1272	46 Leonis	5.74	M0	10 29 57.340	3.2013	- 29	+14 21 11.94	18.500	+ 16
397	203 G. Carinæ* . . .	3.58	B5p	10 30 31.554	2.1355	- 27	-61 28 07.62	18.525	+ 9
396	ρ Leonis	3.85	B0p	10 30 36.030	+3.1580	- 6	+ 9 31 23.92	-18.543	- 6
1273	219 G. Velorum . . .	5.14	K0	10 31 10.394	2.5366	+ 6	-46 47 11.55	18.557	- 1
395	9 H. Draconis	5.04	G5	10 31 34.646	5.0688	- 96	+75 55 48.64	18.579	- 9
399	44 Hydræ	5.32	K2	10 32 00.855	2.8548	- 7	-23 31 41.43	18.566	+ 18
398	37 Ursæ Majoris . .	5.16	F0	10 32 28.199	+3.8565	+ 78	+57 17 58.68	18.565	+ 34
S	10 G. Octantis . . .	6.74	A0	10 33 38.96	-3.750	- 2	-85 52 24.80	-18.631	+ 4
1274	236 G. Hydræ	5.85	F8	10 34 26.762	+2.9873	+175	-12 00 15.09	19.343	-680
401	γ Chamæleontis . .	4.10	M0	10 34 59.298	0.7032	-125	-78 23 22.74	18.659	+ 20
1275	37 Leonis Min. . . .	4.77	G0	10 36 21.676	3.3737	+ 2	+32 11 41.73	18.722	+ 1
402	225 G. Velorum* . . .	4.37	G0	10 37 37.790	2.3906	- 21	-55 23 02.79	18.764	- 2
404	33 Sextantis	6.40	K0	10 39 15.942	+3.0518	- 94	- 1 31 12.93	-18.937	-125
403	35 H. Ursæ Maj. . .	5.23	K0	10 40 05.292	4.2798	- 8	+69 17 47.57	18.854	- 17
1277	78 G. Antliæ	5.73	A0	10 40 46.163	+2.7828	- 23	-32 29 42.93	-18.855	+ 2

No. 390: *Regulus*.No. 385: ω Argus.No. 382: q Velorum.No. C2: $3^m.80$ (γ^2), $4^m.1$, 124° .No. 390: 31 Leonis Minoris. $7^m.0$, very close.No. 393: s Carinæ.No. 397: p Carinæ.No. 402: z Velorum. $6^m.6$, $52''$, 105° .

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				h m s	s	(0 ^u .0001)	° ' "	"	(0 ^u .001)
1276	Pi. 10 ^b 135 U Ma . . .	5.28	F0	10 41 05.294	+3.5212	-260	+46 25 30.39	-18.940	- 73
405	41 Leonis Min.	5.05	A2	10 41 08.103	3.2600	- 85	+23 24 31.72	18.862	+ 5
406	θ Carinæ*	3.03	B0	10 41 27.215	2.1434	- 24	-64 10 25.98	18.865	+ 12
407	42 Leonis Min.	5.37	B9	10 43 32.004	3.3332	- 21	+30 54 14.55	18.978	- 41
1278	Br. 1493 Leonis	6.29	K0	10 43 54.482	3.1230	- 8	+ 6 35 42.03	18.988	- 40
1279	51 Leonis	5.64	K0	10 44 08.880	+3.2303	+ 64	+19 06 48.32	-19.000	- 45
1280	250 G. Hydræ	6.86	K0	10 44 42.820	2.8527	-121	-25 49 37.46	18.922	+ 49
408	μ Velorum*	2.86	G5	10 44 57.469	2.5830	+ 73	-49 11 51.72	19.026	- 49
411	δ ² Chamæleontis	4.62	B3	10 45 24.709	0.5533	-154	-80 19 06.90	18.988	+ 2
409	53 Leonis*	5.27	A0	10 47 03.018	3.1525	- 4	+10 46 04.55	19.064	- 28
410	ν Hydræ	3.32	K0	10 47 33.033	+2.9612	+ 67	-15 58 24.33	-18.855	+195
1281	41 Sextantis	5.78	A2	10 48 11.539	3.0101	- 5	- 8 40 29.43	19.088	- 21
412	46 Leonis Min.	3.92	K0	10 50 58.058	3.3521	+ 69	+34 26 30.20	19.426	-285
414	ι Antliæ	4.70	K0	10 54 45.363	2.7983	+ 67	-36 54 41.69	19.368	-132
413	Br. 1508 Draconis	6.26	G5	10 56 38.968	4.7624	-245	+77 59 44.40	19.313	- 31
1282	47 Ursæ Majoris	5.14	G0	10 57 07.208	+3.3561	-281	+40 39 17.77	-19.244	+ 49
1283	α Crateris	4.20	K0	10 57 43.536	2.9241	-323	-18 04 29.14	19.184	+123
415	239 G. Velorum*	4.56	A2	10 58 13.290	2.7548	+ 17	-42 00 01.03	19.323	- 4
1284	58 Leonis	5.05	K0	10 58 23.483	3.0980	+ 8	+ 3 50 36.31	19.341	- 18
416	β Ursæ Majoris	2.44	A0	10 59 19.166	+3.6132	+ 97	+56 36 28.56	19.317	+ 27
S κ	η Octantis	6.26	A0	10 59 38.50	-0.501	-45	-84 22 04.47	-19.356	- 5
1285	29 G. Leonis	7.13	G5	11 00 28.536	+3.0523	- 14	- 3 17 10.69	19.400	- 30
417	α Ursæ Majoris*	1.95	K0	11 01 09.106	3.6933	-174	+61 58 41.19	19.457	- 71
418	χ Leonis*	4.66	F0	11 02 51.048	3.0940	-231	+ 7 33 48.43	19.471	- 49
419	χ ¹ Hydræ* m	5.06	F5	11 03 18.275	2.8920	-143	-27 03 59.26	19.436	- 4
1286	11 G. Crateris	6.14	A3	11 03 27.402	+3.0118	+ 10	-10 51 40.64	-19.541	-105
1287	65 Leonis*	5.66	G5	11 04 45.650	3.0600	-255	+ 2 11 01.86	19.553	- 90
1288	259 G. Carinæ	5.80	B3	11 05 18.509	2.1703	- 39	-70 39 01.44	19.476	- 2
1289	260 G. Carinæ	4.02	F8p	11 06 47.277	2.5562	- 8	-58 44 49.70	19.505	- 1
420	ψ Ursæ Majoris	3.15	K0	11 07 18.551	3.3686	- 62	+44 43 36.35	19.546	- 31
421	β Crateris	4.52	A2	11 09 35.353	+2.9525	+ 3	-22 35 46.32	-19.663	-103
N η	B.D.+86° 161 Cam	7.17	A2	11 09 45.59	7.049	-40	+85 52 07.17	19.563	+ 1
1290	275 G. Hydræ	6.46	M0	11 10 13.081	2.8935	+ 14	-32 12 19.37	19.567	+ 4
1291	9 G. Centauri	5.67	A2	11 10 37.863	2.7366	- 98	-48 52 20.96	19.539	+ 41
422	δ Leonis	2.58	A3	11 11 52.605	3.1891	+102	+20 45 14.76	19.738	-136
423	θ Leonis	3.41	A0	11 12 02.241	+3.1469	- 43	+15 39 33.94	-19.687	- 82
424	Grb.1757 U Ma	5.97	K0	11 14 20.304	3.3757	- 94	+49 42 20.76	19.661	- 15
1292	φ Leonis	4.58	A5	11 14 31.502	3.0502	- 75	- 3 25 18.33	19.692	- 43
425	ν Ursæ Majoris	3.71	K0	11 16 12.853	3.2379	- 23	+33 19 25.38	19.655	+ 22
1293	55 Ursæ Majoris	4.78	A2	11 16 50.867	3.2667	- 49	+38 24 58.16	19.765	- 76
426	δ Crateris	3.82	K0	11 17 14.300	+3.0006	- 85	-14 33 03.70	-19.495	+200
427	σ Leonis	4.13	A0	11 18 58.233	3.0931	- 64	+ 6 15 35.30	19.735	- 13
428	π Centauri*	4.26	B5	11 19 05.074	+2.7408	- 31	-54 15 37.90	-19.728	- 4

No. 406: θ Argus.
 No. 408: 7^m.0, very close.
 No. 409: ι Leonis.
 No. 415: ι Velorum.
 No. 417: *Dubhe*.

No. 418: 11^m.1, 2^u.5, 256°.
 No. 419: χ Hydræ, 5^m.8 and 5^m.8, less than 0^u.2.
 No. 1287: 10^m.0, 2^u.2, 100°.
 No. 428: 5^m.4, 0^u.4, 138°.

MEAN PLACES OF STARS, 1958.0
FOR JANUARY 0^d.861 UNIVERSAL TIME
(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
429	Grb.1771 U Ma . . .	5.98	A0	11 20 22.535	+3.5550	- 13	+64 33 38.00	-19.715	+ 29
1294	28 G. Centauri . . .	6.42	B3	11 22 21.083	2.8723	- 15	-42 26 17.80	19.782	- 10
431	γ Crateris*	4.14	A5	11 22 46.841	2.9987	- 69	-17 27 11.22	19.780	- 2
1295	Pi. 11 ^b 63 Leonis . .	7.15	A2	11 23 32.338	3.1788	- 23	+26 58 41.83	19.786	+ 3
1296	83 Leonis*	6.54	K0	11 24 37.748	3.0369	- 482	+ 3 14 32.00	19.626	+ 178
1297	τ Leonis	5.18	K0	11 25 46.614	+3.0853	+ 12	+ 3 05 15.84	-19.836	- 17
1298	282 G. Hydræ	6.79	K0	11 27 32.479	2.9729	- 12	-27 47 56.20	19.848	- 7
432	58 Ursæ Majoris. . .	5.88	F8	11 28 15.090	3.2425	- 52	+43 24 14.14	19.775	+ 76
433	λ Draconis	4.06	M0	11 28 55.961	3.5497	- 78	+69 33 47.11	19.879	- 20
434	ξ Hydræ	3.72	G5	11 30 55.889	2.9534	- 161	-31 37 29.71	19.919	- 38
436	λ Centauri	3.34	B9	11 33 49.989	+2.7723	- 53	-62 47 13.77	-19.917	- 5
435	C ² Centauri	5.42	F0	11 33 52.952	2.9111	+ 28	-47 24 30.74	19.964	- 51
1299	θ Crateris	4.81	B9	11 34 32.933	3.0442	- 43	- 9 34 11.27	19.914	+ 4
437	ν Leonis	4.47	K0	11 34 47.831	3.0721	+ 2	- 0 35 30.18	19.883	+ 39
438	π Chamæleontis . . .	5.74	F0	11 35 30.912	2.4843	- 320	-75 39 49.18	19.920	+ 7
439	ο Hydræ	4.88	B8	11 38 07.319	+2.9830	- 30	-34 30 41.81	-19.948	+ 3
1300	61 Ursæ Majoris. . .	5.46	G5	11 38 50.531	3.1565	- 12	+34 26 20.07	20.347	- 390
440	3 Draconis	5.48	K0	11 40 08.780	3.3367	- 83	+66 58 38.78	19.932	+ 34
1301	ζ Crateris	4.90	G5	11 42 37.850	3.0427	+ 24	-18 07 01.77	20.021	- 37
442	λ Muscæ	3.80	A5	11 43 36.761	2.8394	- 149	-66 29 44.87	19.961	+ 30
1302	ν Virginis	4.20	M0	11 43 42.016	+3.0835	- 12	+ 6 45 53.31	-20.178	- 187
441	χ Ursæ Majoris. . . .	3.85	K0	11 43 50.350	3.1640	- 138	+48 00 44.40	19.969	+ 23
443	65 G. Centauri	4.22	G0	11 44 28.160	2.9066	- 42	-60 56 41.02	20.015	- 19
1303	Grb.1826 U Ma	6.64	F0	11 44 52.538	3.2311	- 52	+61 38 08.37	20.043	- 44
1304	93 Leonis	4.54	F8	11 45 49.210	3.0934	- 108	+20 27 08.45	20.014	- 11
1305	298 G. Hydræ	5.45	M3	11 46 37.562	+3.0326	- 20	-26 30 57.94	-20.019	- 12
444	β Leonis*	2.23	A2	11 46 55.085	3.0593	- 342	+14 48 24.73	20.128	- 119
445	β Virginis	3.80	F8	11 48 30.386	3.1251	+ 494	+ 2 00 05.25	20.291	- 275
1306	12 G. Virginis	5.81	K0	11 48 53.298	3.0680	+ 3	- 5 05 59.08	20.024	- 5
446	B Centauri	4.71	K0	11 49 02.145	3.0010	- 88	-44 56 23.79	20.048	- 29
1307	Grb.1830 U Ma	6.46	G5	11 50 33.798	+3.4544	+3381	+38 01 12.57	-25.832	-5807
447	γ Ursæ Majoris. . . .	2.54	A0	11 51 37.776	3.1506	+ 104	+53 55 41.79	20.023	+ 6
1308	95 Leonis	5.49	A2	11 53 30.970	3.0848	+ 7	+15 52 49.75	20.037	- 3
1309	η Crateris	5.16	A0	11 53 52.298	3.0589	- 38	-16 55 01.03	20.046	- 11
1310	Pi. 11 ^b 202 U Ma . . .	6.30	F0	11 55 57.919	3.0799	- 84	+32 30 30.02	20.107	- 69
1311	π Virginis	4.57	A3	11 58 43.207	+3.0742	- 2	+ 6 50 54.59	-20.074	- 33
449	88 G. Centauri	5.28	F0	12 01 28.574	3.1106	+ 292	-42 11 55.92	20.161	- 120
N θ	Grb.1850 Cam	6.38	F5	12 02 32.61	2.820	- 49	+85 49 11.21	19.953	+ 88
450	ο Virginis	4.24	G5	12 03 04.155	3.0557	- 149	+ 8 57 58.48	19.995	+ 45
451	Grb.1852 Cam	5.96	K0	12 03 08.576	3.0361	+ 436	+77 08 25.55	20.140	- 100
1312	311 G. Hydræ	6.26	B9	12 03 46.671	+3.0850	- 43	-35 27 35.76	-20.034	+ 5
452	δ Centauri	2.88	B3p	12 06 10.342	3.1140	- 33	-50 29 18.56	20.045	- 11
453	ε Corvi	3.21	K0	12 07 57.621	3.0877	- 49	-22 23 10.35	20.020	+ 10
1313	3 Comæ	6.34	A0	12 08 23.199	+3.0570	- 14	+17 02 34.17	-20.035	- 6

No. 431: 8^m.0, 5'', 94°.
No. 1296: 7^m.9, 29'', 150°.

No. 444: *Denebola*.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension			Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h	m	s	s	(0 ^o .0001)	° ' "	"	(0 ^o .0001)
454	Br. 1634 Cam* . . .	5.12	A5	12	10	15.221	+2.7974	+ 21	+77 50 58.23	-20.003	+ 19
1314	Br. 1636 U. Ma . . .	6.26	K0	12	12	38.868	2.9705	- 25	+53 40 05.56	20.031	- 19
455	δ Crucis	3.08	B3	12	12	54.135	3.1920	- 44	-58 30 54.71	20.016	- 6
456	δ Ursæ Majoris . . .	3.44	A2	12	13	21.303	2.9646	+125	+57 15 56.87	20.005	+ 3
457	γ Corvi	2.78	B8	12	13	38.540	3.0871	-111	-17 18 31.89	19.990	+ 16
458	2 Canum Venat.* . .	5.92	K5	12	14	01.508	+3.0039	+ 14	+40 53 37.64	-20.043	- 39
459	β Chamæleontis . . .	4.38	B5	12	15	50.421	3.5393	-134	-79 04 44.55	19.978	+ 16
1315	14 Virginis	7.03	K0	12	17	10.316	3.0887	0	- 8 40 52.65	20.012	- 27
1316	3 Canum Venat. . . .	5.56	K2	12	17	44.927	2.9524	- 10	+49 13 01.56	19.978	+ 3
460	η Virginis	4.00	A0	12	17	45.321	3.0700	- 42	- 0 26 00.71	20.004	- 22
1317	16 Virginis	5.10	K0	12	18	12.911	+3.0472	-197	+ 3 32 46.62	-20.048	- 70
1318	12 Comæ	4.78	F5	12	20	23.734	3.0144	- 9	+26 04 44.54	19.975	- 13
1319	322 G. Hydræ	6.34	K0	12	23	06.136	3.1439	+ 3	-27 30 59.96	19.960	- 20
461	6 Canum Venat. . . .	5.22	K0	12	23	46.981	2.9532	- 70	+39 15 04.91	19.973	- 40
462	α Crucis* <i>m</i>	1.05	B1, B1	12	24	15.093	3.3452	- 39	-62 51 59.99	19.942	- 12
463	323 G. Hydræ	5.68	A0	12	24	38.490	+3.1646	- 6	-32 35 50.48	-19.956	- 30
464	σ Centauri	4.16	B3	12	25	45.515	3.2497	- 25	-49 59 53.57	19.936	- 21
1320	122 G. Centauri . . .	5.60	B8	12	26	07.980	3.1933	- 25	-38 48 31.68	19.932	- 20
466	20 Comæ	5.72	A2	12	27	36.681	3.0131	+ 17	+21 07 42.56	19.931	- 34
465	δ Corvi	3.11	A0	12	27	41.228	3.1059	-146	-16 16 54.51	20.039	-143
467	74 Ursæ Majoris . . .	5.44	A5	12	28	00.023	+2.7974	- 87	+58 38 11.84	-19.804	+ 88
468	γ Crucis	1.61	M3	12	28	49.391	3.3344	+ 39	-56 52 41.29	20.147	-264
469	γ Muscæ	4.04	B5	12	29	55.964	3.5972	- 92	-71 54 04.05	19.877	- 6
1321	35 G. Corvi	5.76	G5	12	31	23.318	3.1125	- 17	-12 35 57.40	19.804	+ 50
1322	Pi. 12 ^b 122 C Vn. . .	5.43	K0	12	31	34.896	2.9531	+ 12	+33 28 45.66	19.890	- 39
472	κ Draconis	3.88	B5p	12	31	41.997	+2.5548	-117	+70 01 10.20	-19.842	+ 8
470	β Canum Venat.* . . .	4.32	G0	12	31	45.070	2.8466	-630	+41 35 07.59	19.563	+287
471	β Corvi	2.84	G5	12	32	10.574	3.1539	+ 4	-23 09 52.85	19.902	- 57
1323	23 Comæ	4.78	A0	12	32	45.531	2.9880	- 51	+22 51 36.77	19.822	+ 15
473	24 Comæ* <i>f</i>	5.18	K0	12	33	01.379	3.0084	- 4	+18 36 28.89	19.814	+ 20
1324	25 Virginis	5.90	A0	12	34	37.381	+3.0910	- 22	- 5 36 02.22	-19.834	- 20
474	α Muscæ	2.94	B3	12	34	39.404	3.5892	- 65	-68 54 15.30	19.825	- 13
475	χ Virginis	4.78	K0	12	37	04.528	3.0976	- 52	- 7 45 53.12	19.813	- 33
1325	133 G. Centauri . . .	5.84	K0	12	39	03.888	3.2999	- 77	-45 54 57.37	19.697	+ 64
476	γ Centauri* <i>m</i>	2.38	A0	12	39	11.382	3.3135	-192	-48 43 45.28	19.756	- 6
477	γ Virginis* <i>m</i>	2.90	F0, F0	12	39	31.778	+3.0405	-378	- 1 13 09.51	-19.736	+ 8
478	76 Ursæ Majoris . . .	5.92	A0	12	39	44.181	2.6164	- 56	+62 56 35.90	19.763	- 22
1326	ρ Virginis	4.95	A0	12	39	45.473	3.0365	+ 57	+10 28 00.42	19.835	- 94
479	330 G. Hydræ	5.73	K2	12	41	45.811	3.2000	- 27	-28 05 37.20	19.748	- 38
1327	Y Canum Venat.* . . .	Var.	N3	12	43	09.645	2.8173	+ 1	+45 40 10.33	19.677	+ 10
1328	32 Virginis*	5.24	A5	12	43	29.674	+3.0311	- 73	+ 7 54 09.73	-19.680	+ 2
481	β Crucis	1.50	B1	12	45	15.127	+3.5133	- 47	-59 27 33.68	-19.666	- 14

No. 454: 4 H. Draconis.
 No. 458: 8^m.0, 11'', 259°.
 No. 462: 1^m.58 and 2^m.09, 4'', 4, 116°.
 No. 470: 8 Canum Venaticorum.
 No. 473: 6^m.7, 20'', 271°.

No. 476: 3^m.1 and 3^m.1, 1'', 5, 5°.
 No. 477: 3^m.65 and 3^m.68, 5'', 1, 309°.
 No. 1327: 4^m.8 to 6^m.0.
 No. 1328: δ² Virginis.

MEAN PLACES OF STARS, 1958.0

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
1329	332 G. Hydræ . . .	6.29	B9	12 45 39.359	+3.1916	- 31	-24 37 23.28	-19.612	+ 34
1330	35 Virginis . . .	6.66	M0	12 45 42.996	3.0553	- 5	+ 3 48 06.24	19.649	- 5
1331	143 G. Centauri . . .	5.01	A0	12 48 23.995	3.2583	- 25	-33 46 14.22	19.619	- 23
1332	31 Comæ	5.07	G0	12 49 39.228	2.9210	- 12	+27 46 07.88	19.588	- 16
1333	32 Comæ	6.53	K5	12 50 06.888	2.9825	- 6	+17 18 06.95	19.581	- 17
<i>S d</i>	<i>ι</i> Octantis	5.38	K0	12 50 20.86	+6.385	+47	-84 53 45.02	-19.534	+ 25
482	150 G. Centauri* . . .	4.34	A5	12 51 06.122	3.3269	+ 58	-39 57 02.77	19.570	- 25
1334	52 G. Corvi*	6.84	A0	12 51 47.038	3.1670	- 26	-17 48 36.11	19.534	- 2
1335	<i>ψ</i> Virginis	4.91	M3	12 52 09.920	3.1212	- 17	- 9 18 40.38	19.545	- 20
483	<i>ε</i> Ursæ Majoris . . .	1.68	A0 _p	12 52 11.195	2.6363	+134	+56 11 14.97	19.533	- 9
484	<i>δ</i> Virginis	3.66	M0	12 53 29.168	+3.0224	-314	+ 3 37 31.11	-19.556	- 58
486	8 Draconis	5.27	F0	12 53 48.529	2.3845	- 15	+65 39 57.31	19.528	- 36
485	<i>α</i> C Vn* <i>f</i>	2.90	A0 _p	12 54 03.922	2.8045	-201	+38 32 41.20	19.436	+ 50
1336	44 Virginis	5.88	A0	12 57 29.535	3.0917	- 26	- 3 35 08.66	19.409	+ 5
487	<i>δ</i> Muscæ	3.63	K2	12 59 21.120	4.1437	+573	-71 19 22.38	19.403	- 30
488	<i>ε</i> Virginis	2.95	K0	13 00 05.104	+2.9863	-186	+11 11 04.21	-19.337	+ 19
1337	14 Canum Venat. . . .	5.11	B9	13 03 46.715	2.8038	- 26	+36 01 23.47	19.254	+ 16
1338	Grb.1956 C Vn	5.72	K0	13 03 59.030	2.6970	- 18	+45 29 33.89	19.240	+ 25
1339	39 Comæ	6.04	F5	13 04 18.372	2.9230	- 55	+21 22 42.22	19.304	- 46
489	<i>ξ</i> Centauri	4.40	B3	13 04 26.775	3.5074	- 32	-49 40 53.96	19.265	- 11
1340	177 G. Centauri	5.96	B9	13 05 07.739	+3.5709	- 42	-53 14 07.53	-19.270	- 32
490	<i>θ</i> Virginis*	4.46	A0	13 07 46.329	3 1074	- 23	- 5 18 54.74	19.207	- 35
491	17 Canum Venat.* . . .	6.05	F0	13 08 07.585	2.7532	- 64	+38 43 18.00	19.124	+ 38
1341	342 G. Hydræ*	6.48	A3	13 09 21.843	3.2665	- 41	-26 19 44.21	19.137	- 6
492	<i>β</i> Comæ*	4.32	G0	13 09 54.843	2.7988	-604	+28 05 25.93	18.240	+ 876
493	<i>η</i> Muscæ	4.95	B8	13 12 22.570	+4.0787	- 57	-67 40 21.35	-19.066	- 16
1342	195 G. Centauri	5.36	K0	13 14 32.757	3.3360	+ 30	-31 17 03.77	19.042	- 51
1343	196 G. Centauri	5.87	A3 _p	13 14 47.121	3.4827	- 10	-43 45 29.51	18.997	- 13
1344	<i>σ</i> Virginis	5.01	M0	13 15 28.923	3.0299	- 5	+ 5 41 26.41	18.951	+ 13
494	20 Canum Venat. . . .	4.66	F0	13 15 39.672	2.6886	-110	+40 47 35.72	18.941	+ 18
1345	61 Virginis	4.80	G5	13 16 12.164	+3.1404	-755	-18 04 41.67	-20.017	-1074
495	<i>γ</i> Hydræ	3.33	G5	13 16 38.000	3.2645	+ 54	-22 57 01.83	18.980	- 49
496	<i>ι</i> Centauri	2.91	A2	13 18 13.676	3.3763	-281	-36 29 28.57	18.972	- 88
1346	23 Canum Venat. . . .	5.69	K0	13 18 26.126	2.6868	- 53	+40 22 13.58	18.889	- 10
1347	J Centauri*	4.62	B5	13 19 54.017	3.8856	- 39	-60 46 07.05	18.845	- 10
497	<i>ζ</i> Ursæ Maj.* <i>p</i>	2.40	A2 _p	13 22 14.232	+2.4136	+140	+55 08 39.16	-18.790	- 25
498	<i>α</i> Virginis*	1.21	B2	13 22 58.604	3.1623	- 27	-10 56 33.65	18.775	- 33
1348	68 Virginis	5.59	K2	13 24 29.765	3.1709	- 93	-12 29 22.97	18.718	- 24
499	Grb.2001 U Mi	6.07	K5	13 25 03.596	1.5301	+ 39	+72 36 33.20	18.690	- 13
1350	B.D.+31°2493 C Vn. . .	7.12	K2	13 26 22.246	2.7738	+ 2	+31 21 58.57	18.637	- 2
1349	70 Virginis	5.16	G0	13 26 22.476	+2.9344	-164	+14 00 09.05	-19.214	- 580
500	69 H. Ursæ Maj.	5.41	A0	13 26 54.717	+2.2000	-110	+60 09 44.03	-18.584	+ 33

No. 482: *η* Centauri.No. 1334: 9^m.0, 23'', 294°.No. 485: 12 Canum Venaticorum *f*. 5^m.4, 20'', 228°.No. 490: 8^m.2, 7'', 341°.No. 491: 10^m.5, 1'', 3, 277°.No. 1341: 7^m.2 and 7^m.2, about 0'' .2.

No. 492: 43 Comæ Berenices.

No. 1347: 6^m.5, 60'', 343°.No. 497: 4^m.0, 15'', 150°.No. 498: *Spica*.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0".0001)	° ' "	"	(0".001)
1351	78 Virginis	4.93	A2 _p	13 32 00.087	+3.0409	+ 28	+ 3 52 26.44	-18.476	- 29
501	ζ Virginis	3.44	A2	13 32 33.022	3.0580	-190	- 0 22 54.77	18.393	+ 35
502	17 H. C Vn	4.96	F0	13 32 55.337	2.6773	+ 68	+37 23 49.27	18.428	- 11
1352	80 Virginis	5.75	K0	13 33 19.987	3.1224	+ 9	- 5 10 58.95	18.329	+ 73
1353	Grb.2017 C Vn	6.63	A5	13 33 26.879	2.5522	- 21	+44 24 40.20	18.386	+ 12
S λ	κ Octantis	5.65	A2	13 33 44.03	+9.877	-68	-85 34 21.57	-18.409	- 23
503	49 G. Cha	6.44	A0	13 35 33.171	5.1589	- 36	-75 28 14.11	18.338	- 15
505	Grb.2029 U Mi	5.67	K0	13 36 10.172	1.4419	- 89	+71 27 20.33	18.308	- 6
504	ε Centauri	2.56	B1	13 37 12.769	3.8081	- 22	-53 15 12.45	18.279	- 14
1354	355 G. Hydræ*	6.42	A0	13 39 11.433	3.3135	- 7	-23 14 16.70	18.191	+ 2
1355	82 Virginis	5.16	M0	13 39 24.245	+3.1506	- 67	- 8 29 30.47	-18.151	+ 34
1356	253 G. Centauri	6.30	B2	13 40 10.310	3.9277	- 24	-56 33 23.87	18.166	- 10
1357	83 Virginis	5.71	G0	13 42 13.565	3.2393	+ 9	-15 58 06.99	18.092	- 12
506	1 Centauri*	4.36	F5	13 43 17.612	+3.4128	-363	-32 49 55.41	18.189	-150
N λ	Grb.2063 Cam	6.16	G5	13 43 27.67	-1.626	+20	+82 57 48.30	18.083	- 48
1358	3 Bootis	5.91	F5	13 44 46.281	+2.7852	- 16	+25 54 44.10	-18.047	- 65
507	τ Bootis	4.51	F5	13 45 15.916	2.8510	-338	+17 39 55.33	17.930	+ 34
509	η Ursæ Majoris	1.91	B3	13 45 53.217	2.3629	-126	+49 31 20.45	17.954	- 14
508	μ Centauri	3.32	B2 _p	13 47 04.587	3.6186	- 19	-42 15 54.89	17.917	- 24
510	89 Virginis	5.11	K0	13 47 35.060	3.2621	- 70	-17 55 32.68	17.916	- 43
1359	B.D.+9° 2814 Boo	6.54	A0	13 47 38.917	+2.9808	- 10	+ 8 36 59.16	-17.870	0
511	10 Draconis*	4.77	M0	13 50 12.235	1.7519	- 4	+64 55 48.71	17.778	- 9
513	η Bootis	2.80	G0	13 52 41.029	2.8567	- 44	+18 36 27.01	18.029	-363
512	ζ Centauri	3.06	B2 _p	13 52 54.472	3.7478	- 55	-47 04 56.41	17.699	- 42
1360	B.D.+32° 2411 C Vn	6.29	F2	13 54 18.600	2.6598	-106	+32 14 12.86	17.554	+ 45
514	294 G. Centauri	4.68	K0	13 54 35.180	+4.3527	- 50	-63 28 54.14	-17.618	- 31
515	47 Hydræ	5.17	B8	13 56 09.394	3.3695	- 32	-24 46 04.58	17.549	- 28
1362	204 G. Virginis	6.30	F5	13 57 38.488	3.1098	- 20	- 3 20 45.79	17.525	- 68
1361	48 Hydræ	5.80	F0	13 57 38.619	3.3622	-145	-24 48 22.57	17.557	- 99
517	11 Bootis	6.12	A3	13 59 16.168	2.7200	- 63	+27 35 19.26	17.376	+ 12
516	τ Virginis	4.34	A2	13 59 30.375	+3.0543	+ 11	+ 1 44 49.20	-17.401	- 24
518	β Centauri*	0.86	B1	14 00 50.440	4.2438	- 25	-60 10 16.71	17.339	- 20
1364	307 G. Centauri	6.44	A0 _p	14 00 53.272	3.6588	- 40	-41 13 18.62	17.348	- 32
1363	θ Apodis*	Var.	M3	14 01 10.225	5.8788	-242	-76 35 43.54	17.338	- 35
1365	210 G. Virginis	6.36	K0	14 02 10.257	3.2499	- 27	-14 46 14.53	17.284	- 24
521	α Draconis	3.64	A0 _p	14 03 14.957	+1.6248	- 89	+64 34 33.85	-17.199	+ 13
519	π Hydræ	3.48	K0	14 03 58.396	3.4197	+ 34	-26 28 51.21	17.323	-144
1366	94 Virginis	6.56	A0	14 04 04.094	3.1789	+ 1	- 8 41 31.22	17.157	+ 18
520	θ Centauri	2.26	K0	14 04 12.141	3.5346	-427	-36 09 51.21	17.691	-523
1367	B.D.+39° 2720 C Vn.*	7.90	K0	14 04 40.901	2.5219	+ 10	+38 37 01.65	17.154	- 7
1368	9 H. Bootis	5.44	M3	14 06 15.015	+2.3974	+ 7	+44 03 12.93	-17.105	- 29
522	12 Bootis*	4.82	F5	14 08 28.954	+2.7360	- 18	+25 17 23.45	17.037	- 64
524	4 Ursæ Minoris	5.00	K0	14 08 58.748	-0.2185	-108	+77 44 41.28	-16.923	+ 28

No. 1354: 9^m.7, 31'', 353°.
 No. 508: δ Centauri.
 No. 511: δ Draconis.
 No. 518: 4^m.3, 1'', 3, 258°.

No. 1363: 5^m.5 to 6^m.7.
 No. 1367: 9^m.5, 18'', 45°.
 No. 522: δ Bootis.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
523	κ Virginis	4.31	K0	14 10 39.065	+3.2021	+ 5	-10 04 44.87	-16.736	+ 135
526	α Bootis*	0.24	K0	14 13 44.655	2.7368	- 774	+19 24 01.14	18.722	-1999
525	ι Virginis	4.16	F5	14 13 48.516	3.1476	- 6	- 5 48 03.24	17.148	- 428
528	ι Bootis*	4.87	A5	14 14 40.671	2.1338	- 163	+51 33 37.26	16.590	+ 89
527	λ Bootis	4.26	A0	14 14 47.221	2.2801	- 182	+46 16 49.76	16.516	+ 158
1370	Δ Bootis	4.83	K0	14 16 13.231	+2.5354	- 3	+35 42 09.15	-16.592	+ 12
1369	236 G. Virginis . . .	5.74	A0p	14 16 18.557	3.3197	- 46	-18 31 20.77	16.641	- 42
1371	λ Virginis	4.60	A2	14 16 49.949	3.2482	- 12	-13 10 43.45	16.549	+ 24
1372	18 Bootis	5.31	F0	14 17 14.206	2.9039	+ 71	+13 11 49.86	16.588	- 34
529	ν Centauri	4.41	B5	14 17 22.448	4.1973	- 22	-56 11 38.88	16.561	- 14
1373	ψ Centauri	4.17	A0	14 17 59.588	+3.6525	- 58	-37 41 35.03	-16.526	- 10
1374	2 Libræ	6.30	K0	14 21 09.746	3.2300	- 8	-11 31 23.50	16.421	- 63
530	10 G. Circini	5.71	A2p	14 21 35.405	4.9879	- 23	-68 00 20.69	16.349	- 14
1375	244 G. Virginis . . .	5.08	A3	14 22 05.775	2.9863	- 55	+ 6 00 35.21	16.305	+ 5
1376	3 G. Libræ	5.39	K0	14 22 24.466	3.4259	- 40	-24 37 00.44	16.321	- 27
1377	τ^1 Lupi	4.65	B3	14 23 25.779	+3.8558	- 14	-45 01 56.93	-16.257	- 15
531	θ Bootis	4.06	F8	14 23 45.954	2.0421	- 260	+52 02 39.20	16.626	- 401
1378	22 Bootis	5.36	A5	14 24 30.050	2.7906	- 52	+19 24 53.32	16.166	+ 21
532	52 Hydræ*	5.00	B8	14 25 42.396	3.5170	- 18	-29 18 14.08	16.150	- 26
533	ϕ Virginis*	4.99	K0	14 26 02.108	+3.0926	- 92	- 2 02 26.22	16.112	- 4
1379	5 Ursæ Minoris . . .	4.37	K2	14 27 35.225	-0.1143	+ 12	+75 52 57.73	-16.007	+ 21
534	ρ Bootis	3.78	K0	14 30 01.129	+2.5852	- 80	+30 33 17.83	15.781	+ 117
535	γ Bootis	3.00	F0	14 30 23.166	2.4154	- 98	+38 29 28.21	15.730	+ 149
536	Grb.2125 Draconis . .	6.18	F0	14 30 34.210	1.6292	- 72	+60 24 36.26	15.855	+ 14
537	η Centauri	2.65	B3p, A2p	14 32 49.806	3.8141	- 30	-41 58 28.07	15.781	- 35
1380	σ Bootis	4.48	F0	14 32 51.051	+2.6123	+ 146	+29 55 36.13	-15.618	+ 128
1381	10 G. Libræ	6.24	F8	14 34 45.470	3.1939	- 591	-12 07 40.36	15.282	+ 360
538	α Centauri* c. g. . .	0.06	G0	14 36 43.973	4.0864	-4895	-60 39 48.01	14.828	+ 705
540	33 Bootis	5.39	A0	14 37 16.380	2.2322	- 68	+44 35 06.22	15.524	- 20
539	α Circini	3.42	F0	14 39 05.202	4.8604	- 295	-64 47 37.60	15.639	- 237
541	α Lupi	2.89	B2	14 39 07.482	+3.9956	- 16	-47 12 32.72	-15.419	- 19
1382	32 Bootis	5.63	G5	14 39 42.330	2.8829	- 108	+11 50 26.02	15.486	- 118
545	μ Virginis	3.95	F5	14 40 50.588	3.1633	+ 71	- 5 28 36.08	15.626	- 322
544	371 G. Centauri* . . .	4.13	K0	14 41 04.814	3.6730	- 52	-34 59 38.42	15.476	- 186
1383	34 Bootis	4.93	M0	14 41 34.548	2.6369	- 10	+26 42 19.75	15.282	- 19
542	α Apodis. . . .	3.81	K5	14 42 32.790	+7.4974	- 8	-78 52 07.80	-15.226	- 21
C3	ϵ Bootis*	2.70	K0	14 43 09.099	2.6200	- 38	+27 15 01.30	15.156	+ 17
1384	B.D.+33° 2489 Boo. .	6.47	M0	14 43 28.205	2.5095	+ 31	+32 57 54.88	15.237	- 82
546	30 G. Lupi*	5.20	K0	14 44 04.140	4.2020	- 24	-52 12 25.38	15.202	- 83
547	109 Virginis	3.76	A0	14 44 07.364	3.0343	- 74	+ 2 04 07.60	15.149	- 32
1385	56 Hydræ. . . .	5.39	G5	14 45 17.320	+3.5054	+ 32	-25 54 44.79	-15.051	- 1
1386	Grb.2152 Bootis . . .	5.98	F0	14 47 27.711	2.3552	- 220	+37 59 00.37	14.816	+ 108
1387	α^1 Libræ	5.33	F5	14 48 21.517	+3.3204	- 69	-15 49 25.83	-14.947	- 075

No. 526: *Arcturus*.
 No. 528: 7^m.5, 38'', 33°.
 No. 532: 5^m.8 and 5^m.8, 0''1; 9^m.4, 4''2, 280°.
 No. 533: 9^m.5, 5'', 110°.

No. 538: 0^m.33 and 1^m.70, 2''1, 129°.
 No. 544: ϵ^1 Centauri.
 No. C3: 5^m.12, 2''8, 335°.
 No. 546: δ Lupi.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				^h ^m ^s	^s	(0 ^h .0001)	[°] ['] ["]	["]	(0 ^h .001)
548	α^2 Libræ*	2.90	A3	14 48 33.011	+ 3.3210	- 73	-15 52 06.21	-14.931	- 71
549	Grb.2164 Draconis .	5.67	K2	14 50 22.213	+ 1.5238	- 168	+59 27 50.58	14.620	+ 134
550	β Ursæ Minoris .	2.24	K5	14 50 48.300	- 0.1640	- 84	+74 19 37.77	14.720	+ 9
1388	B.D.+6° 2957 Vir .	6.69	K0	14 51 34.934	+ 2.9694	- 19	+ 6 24 44.76	14.673	+ 8
N κ	Grb.2196 U Mi . . .	5.73	G0	14 53 01.67	- 3.966	+ 90	+82 41 08.56	14.829	- 231
1389	381 G. Centauri . .	5.34	A0	14 53 09.592	+ 3.6864	+ 21	-33 41 11.32	-14.592	- 5
551	Pi. 14 ^b 221 Bootis .	5.77	A0	14 54 14.154	2.8323	- 10	+14 36 53.95	14.526	- 4
1390	ξ^2 Libræ	5.63	K0	14 54 29.083	3.2571	+ 4	-11 14 28.84	14.503	+ 4
1391	33 G. Libræ* . . .	6.00	K5	14 55 00.470	3.5068	+ 744	-21 13 38.26	16.214	-1739
1392	Pi. 14 ^b 227 Bootis .	6.24	A0	14 55 09.990	2.7040	- 10	+21 43 25.99	14.491	- 25
1393	Br. 1908 Virginis . .	5.71	K0	14 55 23.846	+ 3.0777	+ 42	+ 0 00 02.13	-14.479	- 27
552	β Lupi	2.81	B2 _p	14 55 46.216	3.9335	- 37	-42 57 57.79	14.470	- 41
553	κ Centauri	3.35	B3	14 56 25.160	3.9076	- 15	-41 56 13.18	14.418	- 28
554	2 H. Ursæ Min . . .	4.86	M3	14 56 54.443	0.9568	- 138	+66 05 57.41	14.335	+ 26
1394	δ Libræ*	Var.	A0	14 58 43.460	3.2070	- 44	- 8 21 12.37	14.257	- 8
555	β Bootis	3.63	G5	15 00 21.748	+ 2.2597	- 40	+40 33 19.20	-14.182	- 33
556	σ Libræ*	3.41	M3	15 01 36.352	3.5143	- 53	-25 07 05.47	14.118	- 48
557	ψ Bootis	4.67	K0	15 02 38.661	2.5709	- 133	+27 06 37.49	14.015	- 9
1395	47 Bootis	5.59	A0	15 04 02.275	1.9873	- 68	+48 18 45.03	13.890	+ 29
1397	B.D.+55° 1730 Boo .	5.21	G5	15 05 04.569	1.7140	+ 50	+54 43 02.22	13.845	+ 9
<i>S e</i>	20 G. Octantis . . .	6.52	A2	15 05 24.74	+30.350	-179	-87 58 45.00	-13.889	- 71
1396	45 Bootis	5.03	F0	15 05 27.285	2.6354	+ 135	+25 01 53.97	14.003	- 174
1398	κ^1 Lupi*	4.14	B9	15 09 00.142	4.1757	- 100	-48 34 46.59	13.654	- 52
558	ζ Lupi	3.50	K0	15 09 15.243	4.3161	- 121	-51 56 27.01	13.653	- 67
559	ι Libræ	4.66	A0 _p	15 09 49.311	3.4220	- 27	-19 38 02.57	13.592	- 42
1399	1 Lupi	4.95	F0	15 12 02.533	+ 3.6787	- 2	-31 21 49.26	-13.408	- 2
562	3 Serpentis	5.44	K0	15 13 05.910	2.9831	- 14	+ 5 05 38.84	13.336	+ 1
563	δ Bootis	3.54	K0	15 13 48.470	2.4189	+ 66	+33 28 13.73	13.410	- 118
565	1 H. Ursæ Min . . .	5.23	G0	15 14 08.764	0.6929	+ 372	+67 30 21.50	13.660	- 390
561	β Circini	4.16	A3	15 14 12.478	4.7049	- 126	-58 38 45.76	13.402	- 138
564	β Libræ	2.74	B8	15 14 44.566	+ 3.2300	- 66	- 9 13 45.08	-13.252	- 23
560	γ Trianguli Aust .	3.06	A0	15 14 57.504	5.6169	- 105	-68 31 34.74	13.242	- 27
1400	Pi. 15 ^b 36 Ser . . .	5.66	G5	15 16 31.411	2.6903	- 8	+20 43 30.87	13.135	- 23
1401	B.D.+10° 2823 Ser* .	6.71	F8	15 16 40.888	2.8783	- 63	+10 34 47.29	13.101	+ 1
1402	δ Lupi	3.43	B2	15 18 36.366	3.9419	- 13	-40 29 48.77	13.000	- 27
566	ϕ^1 Lupi	3.59	K5	15 19 07.953	+ 3.8100	- 78	-36 06 37.50	-13.026	- 87
1404	73 G. Libræ	6.78	K0	15 20 26.175	3.5879	+ 24	-26 32 24.07	12.859	- 8
1403	ϕ^2 Lupi	4.69	B3	15 20 27.855	3.8366	- 14	-36 42 33.44	12.874	- 25
1405	30 Libræ	6.74	K2	15 20 40.934	+ 3.3480	- 2	-14 59 07.86	12.824	+ 11
569	γ Ursæ Minoris . .	3.14	A2	15 20 46.633	- 0.0869	- 48	+71 59 00.52	12.812	+ 19
1406	8 Serpentis	6.10	F0	15 21 33.594	+ 3.0941	+ 50	- 0 52 25.64	-12.807	- 31
568	μ Bootis <i>p</i>	4.47	F0	15 22 54.134	2.2667	- 124	+37 31 24.56	12.603	+ 83
570	τ^1 Serpentis	5.46	M0	15 23 50.375	+ 2.7830	- 12	+15 34 28.26	-12.636	- 14

No. 548: α Libræ.
 No. 1391: 8^m.9, 20'', 300°.
 No. 1394: 4^m.8 to 5^m.9.

No. 556: γ Scorpii.
 No. 1398: 6^m.0, 27'', 144°.
 No. 1401: 7^m.6, 13'', 170°.

MEAN PLACES OF STARS, 1958.0
FOR JANUARY 0^d.861 UNIVERSAL TIME
(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
571	ι Draconis	3.47	K0	15 23 59.436	+ 1.3361	- 16	+59 06 45.30	-12.600	+ 13
1407	32 Libræ	5.92	K0	15 25 52.981	3.3855	+ 10	-16 34 17.07	12.519	- 36
572	β Coronæ Bor. . . .	3.72	F0 _p	15 26 05.738	2.4739	-138	+29 14 58.01	12.386	+ 82
567	κ ¹ Apodis.	5.65	B5 _p	15 26 53.514	6.5603	+15	-73 14 47.84	12.446	- 34
1408	B.D.+9° 3055 Ser . .	6.46	F2	15 28 52.944	2.9138	+ 24	+ 8 43 17.70	12.279	- 2
573	ν ¹ Bootis	5.15	K5	15 29 25.127	+ 2.1552	+ 7	+40 58 31.35	-12.247	- 7
576	θ Coronæ Bor. . . .	4.17	B5	15 31 14.049	2.4193	- 19	+31 29 59.15	12.131	- 18
1409	37 Libræ	4.83	K0	15 31 52.697	3.2805	+205	- 9 55 19.00	12.309	- 241
575	γ Lupi* m.	2.95	B3	15 32 19.983	4.0018	- 13	-41 01 37.57	12.066	- 30
574	ε Trianguli Aust . .	4.11	K0	15 32 51.065	5.5021	+ 45	-66 10 41.08	12.068	- 69
578	α Coronæ Bor. . . .	2.31	A0	15 32 54.475	+ 2.5405	+ 90	+26 51 17.94	-12.088	- 91
577	γ Libræ	4.02	K0	15 33 10.331	3.3579	+ 43	-14 39 03.22	11.976	+ 1
S μ	ρ Octantis	5.66	A2	15 33 17.26	13.967	+92	-84 19 50.53	11.871	+ 92
1410	115 G. Lupi	5.47	K5	15 33 18.870	4.1131	- 48	-44 15 26.82	12.011	- 44
579	ν Libræ*	3.78	K2	15 34 28.120	3.6451	- 4	-27 59 50.68	11.888	- 2
1411	2 G. Normæ	5.48	A0	15 35 41.437	+ 4.4637	- 39	-52 14 09.29	-11.839	- 40
580	φ Bootis	5.41	G5	15 36 18.983	2.1549	+ 62	+40 29 21.11	11.701	+ 56
1412	Pi. 15 ^b 153 Bootis .	5.78	F0	15 36 55.357	1.9216	+ 81	+46 56 07.11	11.840	- 126
1413	κ Libræ	4.96	K5	15 39 31.298	3.4588	- 27	-19 32 39.13	11.638	- 111
582	α Serpentis.	2.75	K0	15 42 11.804	2.9560	+ 92	+ 6 33 23.49	11.290	+ 46
583	β Serpentis.	3.74	A2	15 44 14.833	+ 2.7697	+ 48	+15 33 07.37	-11.236	- 48
590	ζ Ursæ Minoris . . .	4.34	A2	15 45 30.799	- 2.1212	+ 52	+77 55 28.35	11.103	- 4
587	12 H. Draconis . . .	5.13	A2	15 46 01.150	+ 0.9169	+ 48	+62 43 43.95	11.121	- 61
584	κ Serpentis.	4.28	K5	15 46 50.835	2.7013	- 34	+18 16 12.42	11.088	- 89
585	μ Serpentis.	3.63	A0	15 47 25.510	+ 3.1323	- 58	- 3 18 11.03	10.984	- 28
N λ	Grb.2315 U Mi	7.32	A2	15 47 38.91	- 6.138	+ 4	+83 04 36.09	-10.946	0
586	χ Lupi	4.11	B9	15 48 16.963	+ 3.8150	- 8	-33 30 02.91	10.925	- 32
588	ε Serpentis.	3.75	A2	15 48 43.179	2.9915	+ 85	+ 4 36 10.39	10.798	+ 63
1414	κ Coronæ Bor. . . .	4.77	K0	15 49 38.855	2.2610	- 9	+35 47 11.79	11.146	- 353
1415	λ Libræ	5.06	B3	15 50 53.481	3.4850	- 6	-20 02 34.82	10.729	- 28
1416	χ Herculis	4.61	G0	15 51 13.267	+ 2.0741	+392	+42 34 05.29	-10.049	+ 628
589	β Trianguli Aust. . .	3.04	F0	15 51 25.292	5.2954	-281	-63 18 11.13	11.054	- 394
591	γ Serpentis.	3.86	F5	15 54 30.642	2.7720	+214	+15 47 50.74	11.718	-1286
1417	48 Libræ	4.68	B3 _p	15 55 49.988	3.3613	- 10	-14 09 34.95	10.355	- 22
593	ε Coronæ Bor. . . .	4.22	K0	15 55 50.793	2.4841	- 61	+26 59 54.06	10.397	- 64
592	π Scorpil.	3.00	B2	15 56 18.348	+ 3.6318	- 6	-25 59 40.81	-10.322	- 25
1418	144 G. Lupi	5.07	G5	15 56 38.205	4.0908	- 22	-41 37 31.60	10.282	- 10
595	Grb.2296 Draconis . .	4.96	A5	15 56 47.365	1.4239	-185	+54 52 03.82	10.157	+ 106
594	δ Scorpil.	2.54	B0	15 57 50.717	3.5497	- 5	-22 30 13.38	10.208	- 27
1419	49 Libræ	5.53	F8	15 57 57.897	3.3685	-441	-16 24 40.10	10.570	- 398
1420	50 Libræ	5.55	A0	15 58 31.351	+ 3.2404	- 12	- 8 17 38.49	-10.149	- 18
598	θ Draconis	4.11	F8	16 01 05.836	1.1255	-413	+58 40 36.77	9.602	+ 335
597	β Scorpil* p.	2.90	B1	16 02 59.430	3.4905	- 2	-19 41 31.23	9.813	- 22
596	δ Normæ	4.84	A3 _p	16 03 30.826	+ 4.2437	+ 4	-45 03 39.51	- 9.720	+ 31

No. 575: 3^m.6 and 3^m.8, about 1".
No. 579: 3 H. Scorpil.
No. 597: 5^m.1, 13", 23".

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0".0001)	° ' "	"	(0".001)
599	θ Lupi	4.33	B3	16 03 49.621	+3.9422	- 17	-36 41 22.88	- 9.763	- 36
1421	κ Herculis* <i>p.</i> . . .	5.34	G5	16 06 10.648	2.7083	- 24	+17 09 27.10	9.559	- 12
1422	B.D.+6° 3169 Ser . . .	6.02	G5	16 07 06.937	2.9551	+158	+ 6 29 50.35	10.199	-723
1423	τ Coronæ Bor. . . .	4.94	K0	16 07 26.015	2.1937	- 49	+36 35 47.26	9.127	+324
601	ϕ Herculis	4.26	B9 _p	16 07 26.629	1.8906	- 28	+45 02 39.80	9.416	+ 34
600	κ Normæ	5.09	K0	16 10 09.207	+4.7361	- 11	-54 31 25.85	- 9.265	- 26
602	δ Trianguli Aust . . .	4.03	G0	16 11 35.821	+5.4689	+ 10	-63 34 50.54	9.141	- 15
606	19 Ursæ Minoris . . .	5.51	B8	16 11 59.566	-1.6965	- 15	+75 59 02.73	9.087	+ 13
603	δ Ophiuchi	3.03	M0	16 12 08.486	+3.1451	- 31	- 3 35 15.48	9.231	-146
1424	δ^1 Apodis*	4.78	M3	16 13 59.882	8.9997	- 23	-78 35 37.87	8.974	- 37
1425	17 Herculis	6.59	K0	16 14 29.128	+2.5586	- 12	+23 13 33.27	- 8.917	- 14
605	ϵ Ophiuchi	3.34	K0	16 16 05.749	3.1754	+ 55	- 4 35 29.59	8.737	+ 39
604	γ^2 Normæ	4.14	K0	16 16 41.233	4.4926	-170	-50 03 16.08	8.783	- 54
1426	55 G. Scorpil* <i>f.</i> . . .	5.69	F2	16 16 52.987	3.7975	+ 66	-30 48 23.45	8.692	+ 21
608	τ Herculis	3.91	B5	16 18 28.555	1.8040	- 12	+46 24 45.07	8.552	+ 37
607	σ Scorpil.	3.10	B1	16 18 37.845	+3.6486	- 7	-25 29 37.26	- 8.600	- 24
612	η Ursæ Minoris . . .	5.04	F0	16 18 42.316	-1.7407	-232	+75 51 10.12	8.324	+250
1427	σ Serpentis.	4.80	F0	16 19 56.545	+3.0390	-106	+ 1 07 34.85	8.423	+ 49
609	γ Herculis	3.79	F0	16 20 03.907	2.6470	- 35	+19 15 01.92	8.420	+ 44
1428	23 Herculis*	6.30	A2	16 21 19.595	2.3029	+ 9	+32 25 47.68	8.374	- 10
1429	21 Herculis	5.72	A0	16 22 07.908	+2.9231	- 1	+ 7 02 38.38	- 8.281	+ 18
615	η Draconis*	2.89	G5	16 23 24.992	0.8147	- 30	+61 36 31.92	8.139	+ 58
613	ω Herculis	4.53	A0 _p	16 23 28.507	2.7692	+ 27	+14 07 43.23	8.251	- 59
614	Grb.2343 Draconis . . .	5.66	A2	16 23 30.008	1.3137	+ 13	+55 17 59.71	8.174	+ 17
610	ζ Trianguli Aust . . .	4.93	G0	16 23 55.579	6.4661	+403	-69 59 33.23	8.048	+105
616	α Scorpil*	1.22	M0, A3	16 26 49.688	+3.6809	- 2	-26 20 25.70	- 7.945	- 23
611	γ Apodis.	3.90	K0	16 26 56.559	9.2374	-407	-78 48 24.53	7.978	- 68
1430	22 G. Ophiuchi	5.75	G0	16 27 24.225	+3.3923	+ 20	-14 27 36.47	7.860	+ 16
619	λ Draconis	4.98	B8 _p	16 28 03.265	-0.1126	- 53	+68 51 32.54	7.792	+ 34
618	β Herculis	2.81	K0	16 28 24.738	+2.5794	- 72	+21 34 47.57	7.812	- 16
1431	N Scorpil.	4.33	B3	16 28 37.923	+3.9229	- 5	-34 36 52.44	- 7.793	- 15
1432	Pi. 16 ^b 140 Dra	5.85	A0	16 31 49.689	+0.8493	+ 18	+60 54 39.08	7.534	- 13
623	Grb.2373 U Mi	6.39	G5	16 32 25.096	-2.5656	-331	+77 31 52.53	7.203	+273
621	σ Herculis	4.25	A0	16 32 44.805	+1.9346	- 12	+42 31 21.74	7.403	+ 43
620	τ Scorpil.	2.91	B0	16 33 15.793	3.7368	- 5	-28 07 50.19	7.427	- 25
1433	12 Ophiuchi	5.87	K0	16 34 08.888	+3.1522	+302	- 2 14 11.37	- 7.646	-315
622	ζ Ophiuchi	2.70	B0	16 34 50.572	3.3047	+ 8	-10 29 00.94	7.250	+ 24
1434	42 Herculis	5.14	M0	16 37 36.301	1.6294	- 48	+49 00 35.16	7.018	+ 32
624	Br. 2114 Oph*	5.04	K0	16 39 08.399	3.4711	- 16	-17 39 45.11	6.926	- 3
C4	ζ Herculis* <i>c.g.</i> . . .	3.00	G0	16 39 42.077	2.2618	-372	+31 40 40.13	6.485	+393
626	η Herculis	3.61	K0	16 41 27.242	+2.0572	+ 29	+39 00 04.17	- 6.817	- 83
625	α Trianguli Aust . . .	1.88	K2	16 44 11.941	6.3631	+ 51	-68 57 12.51	6.537	- 33
627	Grb.2377 Draconis . . .	4.88	F0	16 44 29.761	+1.1390	+ 17	+56 51 22.98	- 6.418	+ 65

No. 1421: 6^m.5, 29'', 12°.
 No. 1424: 5^m.2, 103'', 11°.
 No. 1426: 6^m.4, 23'', 319°.
 No. 1428: 8^m.5, 34'', 19°.

No. 615: 8^m.1, 5'', 141°.
 No. 616: *Antares*. 5^m.2, 3'''.0, 274°.
 No. 624: 24 Scorpil.
 No. C4: 3^m.0 and 6^m.5, 1'''.6, 71°.

MEAN PLACES OF STARS, 1958.0

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
<i>S f</i>	26 G. Octantis . .	6.13	A0	16 44 50.74	+22.637	+10	-86 17 48.28	-6.439	0
1436	19 Ophiuchi* . . .	6.04	A2	16 45 02.504	3.0246	- 16	+ 2 08 19.84	6.449	- 12
1435	η Aræ	3.68	K5	16 46 08.824	5.1846	+ 44	-58 58 07.55	6.373	- 30
1437	B.D.-21° 4422 Oph.	7.60	M0	16 47 04.476	3.5797	- 8	-21 46 49.01	6.288	- 20
628	ϵ Scorpii.	2.36	K0	16 47 26.308	3.8880	-490	-34 13 07.55	6.491	-253
1438	20 Ophiuchi	4.73	F5	16 47 30.422	+ 3.3199	+ 63	-10 42 37.30	-6.329	- 97
1439	μ^1 Scorpii.	3.09	B3 <i>p</i>	16 49 01.201	4.0662	- 8	-37 58 38.10	6.133	- 28
1440	51 Herculis	5.20	K0	16 50 00.691	2.4875	+ 9	+24 43 33.17	6.015	+ 9
629	49 Herculis	6.41	A0 <i>p</i>	16 50 09.980	+ 2.7318	+ 10	+15 02 36.00	6.008	+ 3
<i>N g</i>	ϵ Ursæ Minoris .	4.40	G5	16 50 11.84	- 6.116	+ 6	+82 06 33.79	6.011	+ 4
1441	53 Herculis	5.35	F0	16 51 22.338	+ 2.2750	- 78	+31 46 12.10	-5.930	- 20
1442	ι Ophiuchi	4.29	B8	16 52 01.110	2.8392	- 35	+10 13 59.11	5.893	- 37
1444	24 G. Aræ	5.70	B9	16 55 02.995	4.6326	- 14	-50 34 37.06	5.645	- 44
1443	51 G. Apodis . . .	7.00	F8	16 55 05.864	8.2697	- 96	-76 09 15.19	5.743	-149
631	ζ Aræ	3.06	K5	16 55 08.144	4.9684	- 20	-55 55 33.76	5.626	- 33
633	κ Ophiuchi*	3.42	K0	16 55 40.682	+ 2.8401	-199	+ 9 26 20.20	-5.558	- 9
632	ϵ^1 Aræ	4.15	K2	16 56 13.695	4.7846	0	-53 05 53.08	5.484	+ 17
634	ϵ Herculis	3.92	A0	16 58 40.829	2.2956	- 40	+30 59 13.71	5.269	+ 28
1445	30 Ophiuchi	5.00	K0	16 58 50.517	3.1638	- 34	- 4 09 40.38	5.361	- 78
1446	59 Herculis	5.27	A2	17 00 03.188	2.2146	- 4	+33 37 40.38	5.185	- 4
635	60 Herculis	4.91	A3	17 03 25.701	+ 2.7825	+ 33	+12 47 49.77	-4.904	- 8
1448	Pi. 16 ^h 307 Her . .	6.36	A0	17 03 48.045	1.8275	0	+43 52 06.10	4.865	- 1
1447	80 G. Ophiuchi . .	6.20	A0	17 04 16.869	3.7191	+ 3	-26 27 28.84	4.841	- 19
1449	85 G. Ophiuchi . .	6.14	K0	17 05 48.324	3.4845	+ 2	-17 33 18.39	4.727	- 35
636	Grb.2415 Herculis .	6.27	A2	17 06 24.379	1.9572	- 34	+40 34 11.88	4.676	- 33
1450	88 G. Ophiuchi . .	5.58	F5	17 07 28.467	+ 3.3177	+ 38	-10 28 11.87	-4.652	-101
637	η Ophiuchi* <i>m</i> . . .	2.63	A2	17 07 57.985	3.4413	+ 25	-15 40 28.50	4.415	+ 94
639	ζ Draconis	3.22	B5	17 08 39.581	0.1761	- 32	+65 45 58.56	4.431	+ 21
638	η Scorpii.	3.44	F2	17 09 08.395	4.2991	+ 22	-43 11 08.73	4.691	-283
1451	97 G. Ophiuchi . .	6.39	K0	17 09 43.565	2.8933	+ 18	+ 7 56 39.93	4.348	+ 11
640	α^1 Herculis*	Var.	M3	17 12 43.828	+ 2.7360	- 8	+14 26 12.72	-4.066	+ 37
641	δ Herculis*	3.16	A2	17 13 18.270	2.4646	- 18	+24 53 14.87	4.212	-168
643	π Herculis	3.36	K5	17 13 34.933	2.0898	- 25	+36 51 19.63	4.026	+ 4
1452	139 G. Scorpii . . .	5.55	F5	17 14 19.493	3.9040	- 75	-32 37 01.99	4.018	- 53
1453	<i>U</i> Ophiuchi*	Var.	B8	17 14 23.700	3.0443	- 5	+ 1 15 20.89	3.976	- 16
642	ι Apodis	5.60	B8	17 17 24.085	+ 6.6988	+ 12	-70 04 56.05	-3.713	- 14
1454	Pi. 17 ^h 68 Herculis .	5.17	M0	17 18 27.673	2.6441	+ 2	+18 05 56.32	3.665	- 54
1456	72 Herculis	5.36	G0	17 19 05.113	2.2449	+ 98	+32 31 14.16	4.600	-1042
644	θ Ophiuchi	3.37	B3	17 19 25.635	3.6855	- 2	-24 57 33.79	3.548	- 21
645	β Aræ	2.80	K2	17 21 48.151	4.9895	- 7	-55 29 33.16	3.346	- 25
1455	59 G. Apodis	5.93	M3	17 23 33.775	+11.2456	+ 27	-80 49 31.96	-3.206	- 41
1458	138 G. Ophiuchi . .	6.31	F5	17 23 46.960	3.1155	+ 48	- 1 37 00.15	3.104	+ 47
1457	44 Ophiuchi	4.28	F0	17 23 48.139	+ 3.6647	0	-24 08 18.40	-3.266	-11

No. 1436: $9^m.3, 23'', 90^\circ$.
 No. 633: $4^m.1$ to $5^m.0$ (*Kopff*).
 No. 637: $3^m.2$ and $3^m.7$, less than $0''.5$.

No. 640: 3^m.1 to 3^m.9, 5^m.39 (α^2), 4'' .7, 106°.
No. 641: 8^m.1, 9'', 247°.
No. 1453: 5^m.7 to 6^m.4.

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				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
647	27 H. Ophiuchi . . .	4.61	F0	17 24 24.019	+ 3.1837	- 64	- 5 03 03.79	-3.143	- 44
1459	σ Ophiuchi . . .	4.44	K0	17 24 25.704	2.9770	- 1	+ 4 10 31.26	3.090	+ 6
646	45 Ophiuchi* . . .	4.37	F5	17 24 40.161	3.8320	+ 15	-29 49 51.25	3.215	-141
650	77 Herculis* . . .	5.81	A2	17 25 37.288	1.5905	- 4	+48 17 40.05	3.001	- 7
648	δ Aræ	3.79	B8	17 27 18.084	5.4190	- 66	-60 39 04.37	2.935	- 89
649	ν Scorpii	2.80	B3	17 27 54.292	+ 4.0801	0	-37 15 51.32	-2.826	- 31
651	α Aræ	2.97	B3p	17 28 35.449	4.6395	- 28	-49 50 42.40	2.807	- 72
1460	λ Herculis	4.48	K0	17 29 02.341	2.4247	+ 10	+26 08 27.88	2.679	+ 18
653	β Draconis	2.99	G0	17 29 28.872	1.3560	- 21	+52 19 54.41	2.647	+ 12
652	λ Scorpii	1.71	B2	17 30 45.203	4.0749	0	-37 04 30.34	2.575	- 28
655	ν^1 Draconis	4.98	A5	17 31 20.751	+ 1.1816	+165	+55 12 44.40	-2.444	+ 54
657	ν^2 Draconis	4.95	A5	17 31 26.192	1.1827	+168	+55 12 03.24	2.438	+ 53
1462	Grb.2444 Herculis . .	5.82	K0	17 31 47.154	+ 1.9026	- 71	+41 16 19.65	2.523	- 64
659	27 Draconis*	5.21	K0	17 32 07.629	- 0.2390	- 30	+68 09 42.83	2.298	+134
1461	B.D.-11° 4411 Ser . .	5.68	B8	17 32 26.010	+ 3.3354	- 10	-11 12 54.53	2.397	+ 5
656	α Ophiuchi	2.14	A5	17 32 58.980	+ 2.7851	+ 80	+12 35 21.12	-2.581	-226
654	θ Scorpii	2.04	F0	17 34 17.850	4.3119	+ 15	-42 58 23.13	2.237	+ 3
658	ξ Serpentis	3.64	A5	17 35 10.752	+ 3.4355	- 31	-15 22 25.88	2.225	- 62
664	ω Draconis	4.87	F5	17 37 11.552	- 0.3502	0	+68 46 39.22	1.668	+323
663	ι Herculis	3.79	B3	17 38 16.620	+ 1.6938	- 9	+46 01 40.08	1.892	+ 4
660	κ Scorpii	2.51	B2	17 39 34.746	+ 4.1510	- 5	-39 00 37.40	-1.809	- 28
662	μ Aræ	5.26	G5	17 40 48.346	4.7642	- 20	-51 48 49.95	1.861	-188
1463	58 Ophiuchi	4.89	F5	17 40 54.662	3.5957	- 67	-21 39 52.66	1.713	- 48
665	β Ophiuchi	2.94	K0	17 41 23.752	2.9639	- 28	+ 4 34 59.95	1.464	+159
661	η Pavonis	3.58	K0	17 41 36.394	+ 5.8914	- 4	-64 42 23.33	1.653	- 50
670	ψ Draconis* p . . .	4.90	F5	17 42 40.787	- 1.0646	+ 41	+72 10 12.03	-1.780	-267
666	ι^1 Scorpii	3.14	F5p	17 44 38.668	+ 4.1968	+ 2	-40 06 45.76	1.343	- 4
667	μ Herculis	3.48	G5	17 44 48.763	2.3484	-238	+27 44 38.92	2.070	-744
1464	X Sagittarii*	Var.	F5 to G0	17 44 54.858	+ 3.7767	- 2	-27 48 59.97	1.325	- 9
N h	δ Ursæ Minoris . .	4.44	A0	17 45 42.88	-19.408	+11	+86 36 26.20	1.208	+ 55
668	γ Ophiuchi	3.74	A0	17 45 47.091	+ 3.0084	- 16	+ 2 43 17.76	-1.311	- 71
1465	B.D.+20° 3570 Her . .	5.77	K0	17 46 36.495	2.5736	+ 9	+20 34 40.73	1.169	0
669	G Scorpii	3.25	K2	17 46 59.868	4.0849	+ 51	-37 01 54.59	1.099	+ 34
1466	B.D.+9° 3485 Oph . .	6.79	K5	17 48 09.831	+ 2.8388	- 27	+ 9 51 34.72	1.084	- 52
675	35 Draconis	5.04	F5	17 51 19.486	- 2.6854	+105	+76 58 11.10	0.514	+246
1467	B.D.-7° 4523 Oph . .	6.87	G5	17 52 41.010	+ 3.2511	- 35	- 7 43 37.44	-0.694	- 57
671	ξ Draconis	3.90	K0	17 52 48.016	1.0375	+110	+56 52 43.14	0.553	+ 76
1468	89 Herculis	5.48	F5p	17 53 43.396	2.4202	- 2	+26 03 19.63	0.541	+ 6
672	θ Herculis	3.99	K0	17 54 48.643	2.0574	- 1	+37 15 18.03	0.446	+ 6
676	γ Draconis	2.42	K5	17 55 37.725	1.3931	- 13	+51 29 35.27	0.401	- 20
674	ξ Herculis	3.82	K0	17 56 07.862	+ 2.3315	+ 62	+29 15 04.29	-0.355	- 18
673	ν Ophiuchi	3.50	K0	17 56 42.753	3.3029	- 6	- 9 46 12.60	0.405	-120
1469	93 Herculis	4.71	K0.	17 58 11.145	+ 2.6708	- 5	+16 45 06.91	-0.167	- 11

No. 646: d Ophiuchi.
 No. 650: τ Herculis.
 No. 659: f Draconis.

No. 670: 6^m.1, 30'', 15°.
 No. 1464: 4^m.4 to 5^m.0.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^h .0001)	° ' "	"	(0 ^h .001)
677	67 Ophiuchi . . .	3.95	B5p	17 58 32.374	+ 3.0046	- 4	+ 2 55 55.29	-0.136	- 10
1470	6 Sagittarii . . .	6.31	K2	17 58 56.575	3.4857	- 2	-17 09 25.30	-0.097	- 7
679	γ Sagittarii . . .	3.07	K0	18 03 06.508	3.8540	- 41	-30 25 35.29	+0.090	-185
1471	θ Aræ	3.90	B1p	18 03 21.574	4.6696	- 14	-50 05 47.64	0.279	- 18
680	72 Ophiuchi . . .	3.73	A3	18 05 21.412	2.8443	- 43	+ 9 33 23.23	0.553	+ 82
678	66 G. Apodis . . .	5.69	K5	18 05 23.271	+ 8.3946	+ 48	-75 53 46.67	+0.199	-278
681	ο Herculis	3.83	A0	18 05 54.138	2.3402	- 3	+28 45 19.85	0.526	+ 9
1472	B.D.-13° 4863 Ser .	6.50	K0	18 07 20.175	3.4050	+ 1	-13 56 34.99	0.645	+ 1
1473	ε Telescopii . . .	4.60	K0	18 08 06.632	+ 4.4529	- 15	-45 57 49.60	0.681	- 32
	N i λ Ursæ Minoris .	6.55	M3	18 11 00.26	-77.895	-113	+89 03 14.82	0.905	0
682	μ Sagittarii . . .	4.01	B8p	18 11 15.018	+ 3.5877	+ 1	-21 04 17.90	+0.985	- 1
1474	6 G. Telescopii . .	5.54	B5	18 13 35.117	5.0514	- 22	-56 02 19.95	1.179	- 12
685	36 Draconis . . .	5.03	F5	18 13 39.194	0.3447	+ 529	+64 22 58.18	1.226	+ 32
684	Grb.2533 Lyræ . . .	5.42	B5	18 14 20.267	1.8660	- 7	+42 08 38.27	1.250	- 4
683	η Sagittarii* . . .	3.16	M3	18 14 47.025	4.0591	- 109	-36 46 34.45	1.131	-164
1475	Br. 2292 Serpentis .	6.30	A5	18 15 05.283	+ 3.3030	- 1	- 9 46 28.76	+1.257	- 64
687	δ Sagittarii	2.84	K0	18 18 18.283	3.8408	+ 31	-29 50 52.31	1.573	- 29
1477	κ Lyræ	4.34	K0	18 18 23.271	2.1025	- 18	+36 02 40.47	1.650	+ 42
1476	74 Ophiuchi	4.92	G5	18 18 46.145	2.9949	- 4	+ 3 21 24.52	1.652	+ 10
688	η Serpentis	3.42	K0	18 19 08.090	3.1040	- 372	- 2 54 40.58	0.976	-698
686	ξ Pavonis*	4.25	K2	18 19 21.379	+ 5.5265	- 5	-61 30 56.34	+1.698	+ 4
689	ε Sagittarii	1.95	A0	18 21 23.058	+ 3.9822	- 23	-34 24 23.19	1.744	-126
695	χ Draconis	3.69	F8	18 21 48.818	- 1.0837	+1173	+72 42 54.69	1.550	-354
690	109 Herculis	3.92	K0	18 21 54.395	+ 2.5566	+138	+21 44 57.74	1.673	-241
1478	B.D.+7° 3682 Oph .	5.69	G0, A3	18 23 37.460	2.8359	- 6	+ 8 00 25.07	2.058	- 6
691	α Telescopii	3.76	B3	18 23 51.530	+ 4.4475	- 16	-45 59 36.75	+2.044	- 42
1479	B.D.+29° 3259 Her .	5.71	A2	18 24 21.411	2.3127	+ 3	+29 48 12.89	2.106	- 22
692	λ Sagittarii	2.94	K0	18 25 22.666	3.7020	- 33	-25 26 48.07	2.034	-183
696	γ Scuti*	4.73	A3	18 26 48.151	3.4189	0	-14 35 39.47	2.338	- 3
1480	60 Serpentis	5.44	K0	18 27 29.745	3.1218	+ 18	- 2 00 50.53	2.368	- 33
1481	B.D.+16° 3529 Her .	5.67	A0	18 29 12.225	+ 2.6676	- 32	+16 53 52.88	+2.522	- 27
	N μ Br. 2412 Draconis	6.15	A2	18 29 44.28	- 7.948	+ 6	+83 08 53.35	2.557	- 31
	S g χ Octantis	5.22	K0	18 30 29.79	+35.236	- 64	-87 38 51.36	2.552	-132
697	θ Coronæ Aust. . .	4.69	G5	18 30 30.199	+ 4.2828	+ 25	-42 20 41.32	2.642	- 21
700	Grb.2655 Draconis .	5.84	K0	18 31 47.235	- 2.9048	- 12	+77 30 56.76	2.771	+ 2
1483	Grb.2603 Lyræ . . .	6.66	A0	18 32 36.374	+ 1.6948	- 1	+46 11 06.84	+2.857	+ 14
1482	α Scuti	4.06	K0	18 32 55.218	3.2643	- 14	- 8 16 30.25	2.559	-312
1484	B.D.+9° 3783 Oph .	5.40	F2	18 34 27.508	2.8611	- 10	+ 9 05 16.78	2.878	-127
1485	83 G. Sagittarii . .	5.80	A5	18 35 23.492	3.5915	- 2	-21 26 03.34	3.015	- 70
699	α Lyræ*	0.14	A0	18 35 30.908	2.0311	+ 169	+38 44 36.51	3.378	+283
701	Grb.2640 Draconis .	6.00	A3	18 36 05.306	+ 0.1860	+ 16	+65 27 03.48	+3.225	+ 82
698	ζ Pavonis	4.10	K0	18 38 08.383	7.0055	+ 16	-71 28 03.35	3.165	-160
1486	δ Scuti	4.74	F0	18 39 58.378	3.2843	+ 3	- 9 05 39.64	3.481	0
702	ε Scuti*	5.09	G5	18 41 13.952	+ 3.2669	+ 13	- 8 19 06.08	+3.595	+ 6

No. 683: 9m.2, 4'', 105°.
No. 686: 8m.6, 3'', 5, 154°.
No. 696: 2 H. Scuti.
No. 699: Vega.
No. 702: 5 H. Scuti.

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
1487	φ Sagittarii	3.30	B8	18 43 01.930	+3.7471	+ 39	-27 02 08.74	+3.745	+ 1
703	110 Herculis	4.26	F5	18 43 51.151	2.5817	- 12	+20 30 17.36	3.479	-335
1488	B.D.+26°3349 Lyræ .	4.92	K0	18 44 22.839	2.4175	+ 11	+26 36 57.65	3.884	+ 25
1489	β Scuti	4.47	G0	18 44 56.689	3.1825	- 8	- 4 47 39.83	3.890	- 17
1491	111 Herculis	4.37	A3	18 45 09.887	2.6492	+ 48	+18 08 00.17	4.040	+114
1492	Grb.2671 Draconis .	5.76	B5	18 45 46.716	+1.3401	+ 9	+52 56 28.05	+3.974	- 3
1490	η ¹ Coronæ Aust. . .	5.59	A2	18 45 48.659	+4.3281	+ 21	-43 43 39.80	3.970	- 13
1494	50 Draconis	5.37	A0	18 47 44.161	-1.9457	- 54	+75 23 07.81	4.221	+ 78
1493	30 Sagittarii	6.24	F0	18 48 18.942	+3.6048	- 21	-22 12 43.16	4.165	- 31
704	λ Pavonis	4.42	B2	18 48 19.814	5.5542	- 11	-62 14 18.25	4.182	- 17
705	β Lyræ*	Var.	B8p, B2p	18 48 31.652	+2.2147	- 2	+33 18 46.14	+4.211	- 2
707	ο Draconis*	4.85	K0	18 50 34.867	0.8843	+ 98	+59 20 11.54	4.413	+ 25
706	σ Sagittarii	2.14	B3	18 52 39.671	3.7188	+ 10	-26 21 02.52	4.512	- 55
1495	114 G. Sagittarii . .	5.58	F5	18 53 05.797	3.4545	- 24	-16 25 46.08	4.417	-187
711	R Lyræ*	Var.	M3	18 54 03.336	1.8254	+ 17	+43 53 23.50	4.767	+ 83
709	θ Serpentis* p. . .	4.50	A5	18 54 07.832	+2.9821	+ 29	+ 4 08 51.21	+4.728	+ 36
714	ν Draconis	4.91	K0	18 54 55.027	-0.7390	+ 95	+71 14 29.39	4.803	+ 47
708	λ Telescopii	5.03	B9	18 55 06.388	+4.7970	+ 19	-52 59 44.33	4.784	+ 8
710	ξ ² Sagittarii*	3.61	K0	18 55 13.437	3.5778	+ 20	-21 09 49.08	4.771	- 14
713	γ Lyræ	3.30	A0p	18 57 22.245	2.2439	- 7	+32 37 50.86	4.967	+ 1
712	ε Aquilæ	4.21	K0	18 57 42.891	+2.7225	- 39	+15 00 35.56	+4.922	- 74
715	ζ Sagittarii* m. . .	2.71	A2	18 59 56.409	3.8156	- 13	-29 56 31.55	5.183	- 1
716	ζ Aquilæ	3.02	A0	19 03 28.699	2.7570	- 8	+13 47 58.83	5.388	- 94
717	λ Aquilæ	3.55	B9	19 04 01.143	3.1829	- 17	- 4 56 49.37	5.441	- 88
1496	τ Sagittarii	3.42	K0	19 04 19.106	3.7442	- 41	-27 44 00 98	5.304	-250
1497	21 G. Aquilæ* . . .	6.72	B8	19 04 24.657	+3.1061	+ 10	- 1 24 43.01	+5.552	- 9
1498	Pi. 18 ^b 318 Lyræ .	5.46	A5	19 04 57.635	2.3806	+ 55	+28 33 41.06	5.693	+ 87
719	ι Lyræ	5.13	B5	19 05 48.062	2.1404	- 9	+36 01 59.96	5.677	0
718	α Coronæ Aust. . .	4.12	A2	19 06 36.992	4.0797	+ 73	-37 58 18.53	5.648	- 99
720	π Sagittarii*	3.02	F2	19 07 15.980	3.5666	- 1	-21 05 31.74	5.764	- 37
1500	20 Aquilæ	5.37	B3	19 10 23.971	+3.2532	+ 6	- 8 00 40.72	+6.055	- 7
1499	42 G. Octantis . . .	6.78	A2	19 10 41.999	8.1308	- 2	-75 52 24.96	6.079	- 12
723	δ Draconis	3.24	K0	19 12 32.927	0.0105	+160	+67 35 15.67	6.332	+ 93
724	θ Lyræ	4.46	K0	19 14 54.513	2.0820	- 8	+38 03 28.37	6.438	+ 2
722	43 Sagittarii*	5.03	K0	19 15 10.660	3.5087	- 9	-19 01 45.85	6.444	- 16
725	ω Aquilæ	5.14	A5	19 15 50.618	+2.8155	- 4	+11 31 06.14	+6.532	+ 18
726	κ Cygni	3.98	K0	19 16 07.879	+1.3855	+ 61	+53 17 25.04	6.660	+123
729	τ Draconis	4.63	K0	19 16 22.184	-1.1629	-323	+73 16 41.29	6.666	+111
1501	162 G. Sagittarii . .	5.61	B5	19 16 53.077	+3.9736	+ 3	-35 29 58.28	6.598	- 3
727	ν Sagittarii	4.58	B8p, F2p	19 19 19.300	3.4344	- 2	-16 02 07.67	6.796	- 6
1502	β ¹ Sagittarii*	4.31	B8	19 19 37.260	+4.3097	+ 1	-44 32 23.47	+6.808	- 19
728	α Sagittarii	4.11	B8	19 20 58.722	+4.1541	+ 26	-40 41 48.55	+6.820	-118

No. 705: 3^m.4 to 4^m.3.
 No. 707: 7^m.6, 34'', 330°.
 No. 711: 4^m.0 to 4^m.5.
 No. 709: 5^m.4, 22'', 104°.
 No. 710: ξ Sagittarii.

No. 715: 3^m.4 and 3^m.6, 0'''.3, 210°.
 No. 1497: 9^m.1, 14'', 344°.
 No. 720: 3^m.7 and 3^m.8, 0'''.1; 6^m.2, 0'''.4, 122°.
 No. 722: δ Sagittarii.
 No. 1502: 7^m.1, 28'', 77°.

MEAN PLACES OF STARS, 1958.0

FOR JANUARY 0^d.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
1503	31 Aquilæ	5.23	G5	19 22 57.970	+ 2.8600	+489	+11 51 11.21	+7.740	+640
730	δ Aquilæ	3.44	F0	19 23 22.785	+ 3.0240	+167	+ 3 01 46.64	7.218	+ 85
734	Grb.2900 Draconis . .	6.00	A2	19 24 15.652	- 3.6642	+ 41	+79 31 13.40	7.170	- 31
731	186 G. Sagittarii . .	5.68	B9	19 24 17.319	+ 3.7897	+ 15	-29 49 40.75	7.164	- 45
1504	59 G. Telescopii* . .	5.58	K2	19 24 26.092	4.8148	- 2	-54 24 40.21	7.236	+ 15
1505	Br. 2462 Vul	6.04	K5	19 24 38.321	+ 2.6238	- 8	+19 48 24.18	+7.190	- 47
1506	Grb.2844 Cygni . . .	6.72	G5	19 24 39.624	1.8295	- 46	+44 50 48.11	7.161	- 77
1507	Pi. 19 ^b 156 Dra . . .	6.46	B8	19 25 01.106	1.0830	- 20	+57 56 31.71	7.275	+ 9
1508	α Vulpeculæ	4.63	M0	19 26 57.368	2.4961	- 97	+24 34 43.34	7.321	-104
1509	36 Aquilæ	5.22	M0	19 28 27.990	3.1366	+ 9	- 2 52 40.15	7.542	- 6
733	ι Cygni	3.94	A2	19 28 38.780	+ 1.5118	+ 18	+51 38 22.46	+7.691	+130
732	β Cygni* p. . . .	3.24	K0, A0	19 29 01.563	2.4192	- 3	+27 52 12.93	7.588	- 4
1510	8 Cygni	4.85	B3	19 30 12.550	2.2291	- 6	+34 21 45.44	7.688	0
1511	μ Aquilæ	4.65	K0	19 32 02.186	2.9302	+141	+ 7 17 18.29	7.681	-155
735	ι Telescopii	5.02	K0	19 32 06.277	4.4466	- 16	-48 11 30.20	7.808	- 35
736	52 Sagittarii*	4.66	B9	19 34 09.154	+ 3.6490	+ 51	-24 58 40.69	+7.986	- 20
737	κ Aquilæ	5.04	B0	19 34 37.883	3.2263	- 1	- 7 07 20.61	8.040	- 4
738	θ Cygni	4.64	F5	19 35 18.817	1.6074	- 30	+50 07 22.73	8.352	+254
1512	54 Sagittarii	5.45	K0	19 38 19.039	3.4354	+ 46	-16 23 27.85	8.293	- 45
1513	β Sagittæ	4.45	K0	19 39 09.673	2.6941	+ 3	+17 22 38.68	8.371	- 34
1514	55 Sagittarii	5.10	F0	19 40 06.999	+ 3.4298	+ 42	-16 13 26.45	+8.471	- 11
1515	10 Vulpeculæ	5.45	G5	19 41 58.043	2.4942	+ 4	+25 40 12.91	8.648	+ 20
740	15 Cygni	5.02	K0	19 42 45.604	2.1634	+ 56	+37 15 06.66	8.724	+ 34
1516	228 G. Sagittarii . .	5.56	B8	19 43 20.557	3.8253	+ 2	-32 00 41.83	8.717	- 20
742	δ Cygni*	2.98	A0	19 43 39.673	1.8749	+ 44	+45 01 38.60	8.809	+ 48
1517	56 Sagittarii	5.06	K0	19 43 54.775	+ 3.4978	- 95	-19 51 49.19	+8.694	- 87
741	γ Aquilæ	2.80	K2	19 44 15.716	2.8516	+ 9	+10 30 34.83	8.811	+ 3
739	ν Telescopii	5.52	A5	19 44 35.892	4.8930	+102	-56 27 56.07	8.707	-129
743	δ Sagittæ	3.78	M0, A0	19 45 30.819	2.6747	+ 2	+18 25 45.97	8.918	+ 12
S ν	44 G. Octantis . . .	6.32	K0	19 48 24.13	10.996	+ 5	-81 27 35.49	9.139	+ 1
744	51 Aquilæ	5.55	F0	19 48 28.176	+ 3.2999	- 19	-10 52 17.62	+9.172	+ 35
745	α Aquilæ*	0.89	A5	19 48 43.994	2.9263	+359	+ 8 45 21.98	9.546	+388
746	η Aquilæ*	Var.	G0p	19 50 19.965	3.0552	+ 3	+ 0 53 47.41	9.278	- 4
1518	75 G. Pavonis	6.32	A3	19 51 01.297	5.2325	+ 13	-61 16 53.53	9.346	+ 9
1519	90 G. Aquilæ	5.64	F0p, A	19 51 06.738	3.1414	+ 14	- 3 13 28.68	9.358	+ 16
1520	ι Sagittarii	4.21	K0	19 52 22.039	+ 4.1346	+ 7	-41 58 49.70	+9.496	+ 56
749	β Aquilæ	3.90	K0	19 53 14.946	2.9462	+ 26	+ 6 18 02.01	9.029	-478
1521	η Cygni	4.03	K0	19 54 43.733	2.2506	- 30	+34 58 14.89	9.593	- 27
1522	61 Sagittarii	5.05	A0	19 55 34.131	3.4008	+ 7	-15 36 15.71	9.590	- 96
748	ε Pavonis	4.10	A0	19 55 46.234	6.9219	+191	-73 01 27.52	9.573	-130
752	γ Sagittæ	3.71	K5	19 56 53.264	+ 2.6675	+ 42	+19 22 36.98	+9.814	+ 28
751	θ ¹ Sagittarii	4.39	B3	19 57 00.313	3.9015	0	-35 23 29.49	9.771	- 25
1523	15 Vulpeculæ	4.74	A5	19 59 22.158	+ 2.4706	+ 40	+27 38 11.26	+9.985	+ 10

No. 1504: 6^m.9, 70'', 244°.No. 732: 5^m.4, 35'', 54°.No. 736: δ Sagittarii, 9^m.1, 2'', 7, 166°.No. 742: 7^m.9, 1'', 5, 230°.No. 745: *Allair*.No. 746: 3^m.7 to 4^m.4.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
753	62 Sagittarii*	4.60	M3	20 00 04.668	+ 3.6867	+ 27	-27 49 41.38	+10.049	+ 20
1524	τ Aquilæ	5.65	K0	20 02 05.168	2.9293	+ 5	+ 7 09 29.41	10.196	+ 16
755	ξ Telescopii	4.86	M0	20 04 10.581	4.5910	- 15	-53 00 10.50	10.351	+ 12
754	δ Pavonis	3.64	G5	20 04 37.427	+ 5.8743	+1977	-66 17 29.68	9.236	-1136
N ν	Grb.3212 Draconis	6.61	A2	20 05 42.45	- 8.890	- 8	+84 32 59.97	10.403	- 41
1525	28 Cygni	4.82	B2 p	20 07 51.910	+ 2.2279	- 2	+36 42 54.00	+10.627	+ 15
756	θ Aquilæ	3.37	A0	20 09 08.245	+ 3.0943	+ 22	- 0 56 50.58	10.713	+ 7
759	κ Cephei*	4.43	B9	20 10 20.279	- 2.0398	+ 21	+77 35 09.15	10.820	+ 28
757	α^2 Cygni*	3.95	K0, B8	20 12 18.448	+ 1.8886	- 3	+46 36 47.42	10.945	+ 6
1526	ρ Aquilæ	4.96	A0	20 12 19.941	2.7757	+ 36	+15 04 06.03	10.996	+ 55
758	33 Cygni	4.32	A3	20 12 25.291	+ 1.3935	+ 72	+56 26 19.09	+11.031	+ 83
760	24 Vulpeculæ	5.45	K0	20 14 59.156	2.5670	+ 9	+24 32 26.37	11.121	- 14
1527	α^1 Capricorni	4.55	G0 p	20 15 19.225	3.3234	+ 11	-12 38 21.83	11.163	+ 4
1529	δ Capricorni	5.96	K0	20 15 33.442	3.5225	+ 23	-21 56 28.63	11.148	- 29
761	α^2 Capricorni	3.77	G5	20 15 43.493	3.3268	+ 41	-12 40 35.10	11.195	+ 6
1528	83 G. Telescopii	6.28	M0	20 15 55.612	+ 4.2975	+ 6	-47 50 33.51	+11.210	+ 5
1530	290 G. Sagittarii	6.51	K2	20 18 09.321	3.8687	+ 14	-35 48 27.24	11.393	+ 28
762	β Capricorni	3.25	G0, A0	20 18 39.148	3.3687	+ 26	-14 54 55.55	11.404	+ 3
763	κ^1 Sagittarii	5.64	A0	20 19 36.723	4.0695	+ 32	-42 11 00.85	11.383	- 88
765	γ Cygni	2.32	F8 p	20 20 43.158	2.1531	0	+40 07 16.83	11.550	+ 2
1531	132 G. Aquilæ	5.41	K0	20 21 05.767	+ 2.9715	- 25	+ 5 12 27.18	+11.541	- 35
764	α Pavonis	2.12	B3	20 22 20.190	4.7393	+ 11	-56 52 17.40	11.583	- 82
1532	296 G. Sagittarii	5.97	K0	20 22 52.692	3.6705	+ 8	-28 48 02.92	11.722	+ 19
S h	σ Octantis	5.48	F0	20 25 03.10	72.516	+127	-89 06 46.56	11.896	- 1
1533	69 Aquilæ	5.11	K0	20 27 27.284	3.1343	+ 44	- 3 01 35.06	12.011	- 14
1534	41 Cygni	4.09	F5 p	20 27 40.661	+ 2.4512	+ 2	+30 13 38.35	+12.038	- 3
1535	42 Cygni	5.94	A0	20 27 44.170	2.2886	+ 1	+36 18 49.03	12.046	+ 2
767	θ Cephei	4.28	A5	20 28 52.727	1.0044	+ 60	+62 51 09.19	12.113	- 11
1536	29 G. Capricorni*	5.82	G5	20 30 05.840	+ 3.2804	+ 202	- 9 59 52.94	12.312	+ 103
1538	Grb.3241 Draconis	6.42	K2	20 30 12.326	- 0.2655	- 14	+72 23 22.61	12.198	- 16
768	ϵ Delphini	3.98	B5	20 31 12.317	+ 2.8656	+ 4	+11 09 33.89	+12.269	- 17
1537	9 G. Delphini	6.68	K0	20 31 54.455	+ 2.9864	+ 6	+ 4 45 14.51	12.328	- 6
770	73 Draconis	5.18	A2 p	20 32 04.981	- 0.8032	+ 10	+74 48 39.82	12.333	- 11
S ξ	48 G. Octantis	7.08	A0	20 32 53.88	+14.114	+ 36	-84 33 19.30	12.390	- 19
769	α Indi	3.21	K0	20 34 37.227	4.2145	+ 50	-47 26 22.17	12.594	+ 72
1539	29 Vulpeculæ	4.78	A0	20 36 38.660	+ 2.6791	+ 44	+21 03 09.84	+12.666	+ 8
772	κ Delphini	5.23	G5	20 37 05.292	2.9132	+ 210	+ 9 56 13.47	12.709	+ 21
773	ν Capricorni	5.33	M0	20 37 39.615	3.4130	- 15	-18 17 16.29	12.710	- 18
774	α Delphini	3.86	B8	20 37 41.156	2.7862	+ 41	+15 45 46.08	12.730	+ 1
1540	13 G. Microscopii	5.54	K2	20 37 42.013	3.7611	+ 26	-33 34 54.04	12.780	+ 50
777	α Cygni*	1.33	A2 p	20 39 59.906	+ 2.0452	0	+45 07 46.11	+12.888	+ 5
776	η Indi	4.70	F0	20 40 57.889	4.3992	+ 172	-52 04 21.55	12.896	- 54
775	β Pavonis	3.60	A5	20 41 11.862	+ 5.3941	- 64	-66 21 21.67	+12.983	+ 18

No. 753: ϵ Sagittarii.
 No. 759: $8^m.0, 7'', 122^\circ$.
 No. 767: β Cygni.

No. 1536: $11^m.2, 3'', 8, 28^\circ$.
 No. 777: *Deneb*.

MEAN PLACES OF STARS, 1958.0
FOR JANUARY 0^d.861 UNIVERSAL TIME
(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
778	δ Delphini	4.53	A5	20 41 29.811	+2.8005	- 16	+14 55 22.18	+12.944	- 40
779	ψ Capricorni	4.26	F8	20 43 36.683	3.6494	- 40	-25 25 23.50	12.970	- 155
782	6 H. Cephei	4.63	G0	20 44 18.536	1.4881	- 86	+57 25 42.47	12.936	- 234
783	η Cephei	3.59	K0	20 44 26.251	1.2183	+ 127	+61 40 30.90	14.000	+ 822
780	ε Cygni	2.64	K0	20 44 30.592	2.4277	+ 283	+33 48 43.27	13.514	+ 330
1541	γ Delphini* f. . . .	4.49	G5	20 44 42.488	+2.7828	- 28	+15 58 18.76	+13.004	- 193
1544	Grb.3285 Cygni . . .	6.43	K0	20 45 08.048	1.7390	- 97	+52 50 30.08	13.118	- 106
781	ε Aquarii	3.83	A0	20 45 24.182	3.2459	+ 20	- 9 39 02.63	13.212	- 31
1543	3 Aquarii	4.60	M0	20 45 31.283	3.1641	- 2	- 5 10 57.66	13.214	- 37
1542	ι Microscopii	5.14	F0	20 45 38.677	+4.0624	+ 167	-44 08 34.98	13.157	- 102
Nk	76 Draconis	5.69	A0	20 45 44.84	-4.400	+ 14	+82 22 38.86	+13.289	+ 27
1545	B.D.-1° 4057 Aqr . .	6.53	M3	20 47 07.627	+3.0835	- 24	- 0 43 10.51	13.344	- 12
1546	ω Capricorni	4.24	M0	20 49 19.074	3.5776	- 7	-27 04 39.57	13.496	- 2
1547	μ Aquarii	4.80	A3	20 50 23.347	3.2343	+ 26	- 9 08 31.58	13.539	- 28
785	β Indi	3.72	K0	20 51 32.517	4.6801	+ 23	-58 36 51.20	13.623	- 19
786	32 Vulpeculæ	5.24	K5	20 52 46.084	+2.5571	- 6	+27 53 49.02	+13.721	+ 2
1548	64 G. Capricorni . .	5.95	A3	20 55 19.629	3.3564	+ 31	-16 11 40.10	13.882	+ 1
788	ν Cygni	4.04	A0	20 55 36.309	2.2369	+ 5	+41 00 17.01	13.889	- 9
1549	33 Vulpeculæ	5.57	K5	20 56 23.579	2.6820	- 6	+22 09 45.52	13.955	+ 6
789	11 Aquarii	6.26	G0	20 58 21.127	3.1574	+ 26	- 4 53 36.90	13.940	- 131
1551	59 Cygni*	4.88	B0p	20 58 23.716	+2.0404	0	+47 21 22.64	+14.078	+ 5
1550	γ Microscopii	4.71	G5	20 58 43.149	3.6767	0	-32 25 23.74	14.100	+ 6
787	α Octantis	5.24	F2	20 59 42.090	7.2345	+ 35	-77 11 11.01	13.795	- 362
790	ζ Microscopii	5.35	F0	21 00 17.254	3.8294	- 25	-38 47 48.53	14.082	- 109
792	ξ Cygni	3.92	K5	21 03 24.055	2.1826	+ 4	+43 45 34.35	14.386	+ 5
1552	θ Capricorni	4.19	A0	21 03 35.283	+3.3705	+ 57	-17 24 03.15	+14.339	- 54
1553	B.D.-0° 4161 Aqr . .	7.10	K2	21 04 24.059	3.0785	+ 6	- 0 16 27.11	14.458	+ 15
791	A Capricorni	4.60	M0	21 04 40.439	3.5062	- 20	-25 10 30.03	14.416	- 43
793	61 Cygni* c. g. . . .	5.57	K5	21 05 01.454	+2.6898	+3522	+38 32 20.33	17.668	+3187
795	Br. 2777 Cephei . . .	5.90	B9	21 06 22.250	-1.2251	+ 60	+77 57 23.70	14.595	+ 36
794	ν Aquarii	4.52	K0	21 07 18.434	+3.2662	+ 61	-11 32 34.39	+14.606	- 12
1555	γ Equulei*	4.76	F0p	21 08 17.918	2.9174	+ 38	+ 9 57 40.92	14.526	- 151
1554	ο Pavonis	5.08	M0	21 09 26.225	5.6089	+ 85	-70 17 58.66	14.714	- 32
1556	58 G. Microscopii . .	5.55	K5	21 10 48.110	3.5546	+ 73	-27 47 30.79	14.710	- 116
797	ζ Cygni	3.40	K0	21 11 08.784	2.5536	- 4	+30 03 13.72	14.792	- 53
796	23 G. Indi	5.84	A5	21 12 46.453	+4.2759	+ 18	-53 26 17.70	+14.930	- 11
800	α Equulei	4.14	F8, A3	21 13 43.423	2.9983	+ 36	+ 5 04 23.58	14.913	- 83
1557	24 G. Indi	6.70	K0	21 15 01.428	4.0803	- 24	-48 53 38.55	14.993	- 79
801	ε Microscopii*	4.79	A0	21 15 23.699	3.6341	+ 39	-32 20 57.13	15.072	- 21
1558	σ Cygni	4.28	A0p	21 15 45.810	2.3569	- 4	+39 13 04.23	15.111	- 2
1559	ν Cygni	4.42	B3p	21 16 11.293	+2.4672	+ 6	+34 43 10.81	+15.135	- 2
803	α Cephei	2.60	A5	21 17 34.619	1.4307	+ 212	+62 24 25.84	15.269	+ 52
802	θ Microscopii	4.92	A2p	21 18 04.798	+3.8325	+ 56	-40 59 17.94	+15.246	- 1

No. 1541: 5^m.5, 10'', 269°.
No. 1551: 9^m.3, 20'', 353°.
No. 793: 6^m.3, 28'', 140°.
No. 1555: 11^m.0, 2'', 2, 265°.
No. 801: 4 Piscis Austrini.

FOR JANUARY 0^h.861 UNIVERSAL TIME

(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^h .0001)	° ' "	"	(0 ^h .001)
1560	Grb.3434 Cygni*	6.81	K2	21 18 19.605	+1.9295	+ 6	+52 52 46.70	+15.260	0
1561	ι Capricorni . . .	4.30	K0	21 19 54.595	3.3384	+ 22	-17 00 52.33	15.356	+ 6
804	1 Pegasi	4.27	K0	21 20 08.543	2.7746	+ 72	+19 37 26.17	15.430	+ 68
1562	18 Aquarii	5.54	A5	21 21 53.863	3.2766	+ 60	-13 03 33.81	15.471	+ 11
805	γ Pavonis	4.30	F8	21 22 59.819	4.9479	+ 151	-65 33 28.25	16.321	+ 799
1563	γ Indi	6.24	F0	21 23 16.450	+4.2725	+ 8	-54 50 35.28	+15.583	+ 46
806	ζ Capricorni	3.86	G5p	21 24 16.324	3.4228	+ 1	-22 35 39.58	15.619	+ 27
1564	2 G. Pegasi	6.66	M0	21 26 20.556	2.9569	+ 4	+ 8 00 42.84	15.672	- 33
807	71 Cygni*	5.34	K0	21 27 53.800	2.2147	+ 42	+46 21 17.07	15.897	+ 109
1565	2 Pegasi	4.76	K5	21 28 02.590	2.7179	+ 13	+23 27 13.96	15.803	+ 6
809	β Cephei*	3.33	B1	21 28 07.517	+0.7698	+ 21	+70 22 34.39	+15.814	+ 14
808	β Aquarii	3.07	G0	21 29 20.905	3.1569	+ 12	- 5 45 24.87	15.862	- 4
1566	6 Piscis Austrini . .	5.99	A2	21 29 42.472	3.6261	+ 6	-34 07 50.89	15.883	- 3
1567	3 G. Gruis	5.73	K0	21 30 40.674	3.8827	- 18	-45 02 07.78	15.934	- 4
1568	ρ Cygni	4.22	K0	21 32 23.898	2.2573	- 25	+45 24 19.82	15.938	- 90
811	74 Cygni	5.09	A5	21 35 15.749	+2.4055	- 7	+40 13 27.17	+16.196	+ 19
1569	ξ Aquarii	4.78	A5	21 35 30.991	3.1921	+ 74	- 8 02 36.66	16.169	- 22
1570	5 Pegasi	5.29	F0	21 35 47.401	2.8077	+ 70	+19 07 43.58	16.221	+ 16
810	ν Octantis	3.74	K0	21 36 53.159	6.6369	+ 137	-77 34 42.25	16.023	- 240
813	13 H. Cephei* . . .	5.97	Oe5	21 37 39.286	1.8617	- 7	+57 17 54.99	16.300	0
812	γ Capricorni	3.80	F0p	21 37 45.948	+3.3218	+ 131	-16 51 10.96	+16.284	- 22
817	11 Cephei	4.85	K0	21 41 18.735	0.8745	+ 235	+71 07 04.45	16.589	+ 105
815	ε Pegasi	2.54	K0	21 42 07.323	2.9462	+ 18	+ 9 40 53.80	16.529	+ 5
814	ι Piscis Austrini . .	4.35	A0	21 42 26.997	3.5703	+ 29	-33 13 06.37	16.450	- 91
1571	B.D.+35° 4626 Cyg .	6.60	K0	21 43 57.492	2.5447	+ 76	+35 39 46.45	16.631	+ 17
1572	ν Cephei	4.46	A2p	21 44 14.119	+1.7310	- 7	+60 55 35.54	+16.629	+ 2
818	λ Capricorni	5.43	A0	21 44 16.508	3.2276	+ 17	-11 33 37.89	16.626	- 4
819	δ Capricorni	2.98	A5	21 44 43.467	3.3092	+ 181	-16 19 07.68	16.359	- 293
1574	11 Pegasi	5.50	A0	21 45 06.151	3.0416	+ 5	+ 2 29 27.98	16.675	+ 5
821	π ² Cygni	4.26	B3	21 45 14.310	2.2176	+ 2	+49 06 52.66	16.679	+ 2
1573	13 G. Gruis	5.75	G5	21 45 32.358	+3.8962	+ 159	-47 29 44.81	+16.397	- 295
820	ο Indi	5.50	K2	21 47 16.050	5.0586	- 44	-69 49 34.57	16.773	- 3
1575	14 Pegasi	5.00	A0	21 47 59.028	2.6546	+ 10	+29 58 40.51	16.785	- 23
1576	127 G. Capricorni . .	6.85	F8	21 49 01.381	3.4124	+ 253	-23 28 01.26	16.774	- 84
1577	μ Capricorni	5.18	F0	21 51 00.456	3.2690	+ 211	-13 45 01.42	16.965	+ 14
823	16 Pegasi	5.05	B3	21 51 08.916	+2.7305	+ 2	+25 43 36.52	+16.961	+ 3
822	γ Gruis	3.16	B8	21 51 23.472	3.6286	+ 85	-37 33 47.75	16.957	- 12
1578	Br. 2880 Cephei . . .	6.58	A0	21 52 17.998	0.6953	+ 79	+73 30 12.70	17.041	+ 31
1579	Pi. 21 ^b 339 Pegasi . .	6.62	K5	21 54 25.995	2.8054	- 4	+21 02 22.29	17.128	+ 19
824	δ Indi* m.	4.56	F0	21 55 04.397	4.0759	+ 63	-55 11 35.92	17.136	- 3
1580	98 G. Aquarii	6.42	K0	21 56 43.555	+3.1277	- 4	- 4 34 17.85	+16.959	- 254
826	20 Pegasi	5.66	F2	21 59 02.467	2.9226	+ 35	+12 55 05.07	17.270	- 46
825	ε Indi	4.74	K5	22 00 09.674	+4.5795	+4806	-56 57 34.95	+14.820	-2545

No. 1560: 8^m.4, 48'', 301°.
 No. 807: *g* Cygni.
 No. 809: 7^m.8, 14'', 250°.

No. 813: 7^m.5, 12'', 120°; 8^m.0, 20'', 340°.
 No. 824: 5^m.3 and 5^m.3, less than 0''.2.

MEAN PLACES OF STARS, 1958.0
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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
1581	λ Gruis	4.60	K2	22 03 35.391	+ 3.6118	- 18	-39 44 48.54	+17.398	- 114
827	α Aquarii	3.19	G0	22 03 37.589	3.0804	+ 10	- 0 31 28.59	17.511	- 4
830	20 Cephei	5.39	K5	22 03 43.751	1.8243	+ 21	+62 34 49.33	17.582	+ 64
828	ι Aquarii	4.35	B8	22 04 10.211	3.2381	+ 26	-14 04 27.23	17.485	- 53
831	ι Pegasi	3.96	F5	22 05 03.173	2.7936	+ 216	+25 08 21.50	17.603	+ 28
829	α Gruis	2.16	B5	22 05 35.670	+ 3.7754	+ 123	-47 09 54.93	+17.451	- 147
832	μ Piscis Austrini	4.62	A2	22 05 56.274	3.4970	+ 64	-33 11 39.90	17.575	- 37
833	27 Pegasi	5.65	K0	22 07 21.769	2.6596	- 49	+32 57 59.56	17.608	- 63
834	θ Pegasi	3.70	A2	22 08 04.801	3.0258	+ 181	+ 5 59 26.24	17.737	+ 37
835	π Pegasi	4.38	F5	22 08 07.122	2.6657	- 13	+32 58 17.44	17.685	- 17
837	24 Cephei	4.99	G5	22 09 00.199	+ 1.1496	+ 63	+72 08 03.22	+17.751	+ 14
836	ζ Cephei	3.62	K0	22 09 23.590	2.0827	+ 14	+57 59 37.56	17.762	+ 8
838	λ Piscis Austrini	5.40	B9	22 11 56.147	3.3977	+ 20	-27 58 33.45	17.856	0
1583	1 H. Lacertæ	4.64	K2	22 12 04.335	2.5769	+ 33	+39 30 21.22	17.872	+ 11
1582	125 G. Aquarii	6.60	G5	22 12 21.841	3.2463	- 8	-16 01 24.45	17.521	- 352
840	θ Aquarii	4.32	K0	22 14 37.082	+ 3.1644	+ 78	- 7 59 35.31	+17.943	- 19
839	ε Octantis	5.11	M3	22 15 26.549	6.6760	+ 302	-80 39 00.53	17.960	- 34
841	α Tucanæ	2.91	K2	22 15 38.539	+ 4.1020	- 83	-60 28 11.13	17.967	- 34
N ξ	32 H. Cephei	5.38	A0	22 16 54.42	- 4.984	+ 51	+85 53 51.93	18.096	+ 50
1584	47 Aquarii	5.40	K0	22 19 17.017	+ 3.3003	- 5	-21 48 34.13	18.055	- 84
843	31 Pegasi	4.93	B3p	22 19 26.927	+ 2.9531	+ 2	+11 59 35.14	+18.162	+ 17
842	γ Aquarii	3.97	A0	22 19 29.204	3.0978	+ 85	- 1 35 58.60	18.159	+ 13
844	β Lacertæ*	4.58	K0	22 21 54.203	2.3613	- 19	+52 01 05.21	18.049	- 185
1585	π Aquarii	4.64	B1p	22 23 07.886	3.0633	+ 10	+ 1 09 49.01	18.283	+ 4
1586	Pi. 22 ^h 97 Pegasi	6.40	K0	22 23 38.916	2.8951	+ 13	+18 13 48.72	18.336	+ 39
S π	ν Octantis	5.74	K0	22 24 09.71	+11.157	- 37	-86 11 00.03	+18.380	+ 62
S o	B Octantis	6.54	A5	22 25 14.09	34.876	+ 63	-89 02 10.62	18.322	- 40
1587	72 G. Indi	5.70	A3	22 25 33.722	4.4053	+ 276	-67 42 11.29	18.301	- 65
845	ν Gruis	5.48	K0	22 26 11.852	3.5123	+ 32	-39 20 41.77	18.231	- 156
846	δ ¹ Gruis	4.02	G5	22 26 45.989	3.5811	+ 24	-43 42 38.96	18.409	+ 2
1588	36 Pegasi	5.82	K2	22 27 02.138	+ 2.9943	+ 36	+ 8 54 50.42	+18.401	- 15
1589	Pi. 22 ^h 120 Pegasi	5.96	K2	22 27 11.942	2.8120	+ 15	+26 32 52.33	18.417	- 5
847	δ Cephei*	Var.	F5 to G0	22 27 36.347	2.2292	+ 11	+58 11 59.08	18.439	+ 3
1590	38 Pegasi	5.51	A0	22 28 06.326	2.7456	+ 25	+32 21 25.63	18.442	- 11
1591	σ Aquarii	4.89	A0	22 28 25.513	3.1734	0	-10 53 36.71	18.437	- 27
1592	β Piscis Aust.*	4.40	A0	22 29 07.338	+ 3.4081	+ 53	-32 33 42.94	+18.482	- 6
1593	ρ Cephei	5.50	A2	22 29 31.568	0.5211	- 13	+78 36 31.37	18.486	- 14
848	α Lacertæ*	3.85	A0	22 29 33.346	2.4738	+ 140	+50 03 58.10	18.525	+ 23
1594	Grb.3834 Cephei	5.74	A0	22 31 32.325	1.0473	- 70	+76 00 35.61	18.565	- 2
849	ν Aquarii	5.29	F5	22 32 23.914	3.2794	+ 155	-20 55 26.47	18.453	- 143
850	η Aquarii	4.13	B8	22 33 11.869	+ 3.0822	+ 60	- 0 20 04.23	+18.572	- 50
851	31 Cephei	5.22	F0	22 34 43.813	1.4806	+ 392	+73 25 30.00	18.702	+ 31
1595	κ Aquarii	5.33	K0	22 35 34.872	3.1060	- 48	- 4 26 42.66	18.586	- 112
853	30 Cephei	5.21	A2	22 37 09.265	+ 2.1300	- 12	+63 21 56.88	+18.728	- 20

No. 844: 3 Lacertæ.
No. 847: 3^m.7 to 4^m.4, 6^m.6, 41'', 192°.
No. 1592: 7^m.8, 30'', 172°.
No. 848: 7 Lacertæ.

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(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^s .0001)	° ' "	"	(0 ^s .001)
852	10 Lacertæ	4.91	Oe5	22 37 22.328	+2.6940	- 1	+38 49 52.28	+18.751	- 3
854	ε Piscis Austrini . .	4.22	B8	22 38 20.163	3.3156	+ 21	-27 15 47.49	18.789	+ 6
855	ζ Pegasi	3.61	B8	22 39 21.939	2.9924	+ 53	+10 36 41.83	18.808	- 7
856	β Gruis	2.24	M3	22 40 10.062	3.5774	+133	-47 06 17.39	18.836	- 3
857	η Pegasi	3.10	G0	22 41 01.774	2.8138	+ 9	+30 00 04.07	18.842	- 22
<i>S i</i>	β Octantis	4.34	F0	22 41 53.34	+6.073	- 23	-81 36 09.82	+18.899	+ 9
858	13 Lacertæ	5.24	K0	22 42 12.787	2.6776	- 10	+41 35 54.50	18.910	+ 11
1596	45 Pegasi	6.45	K0	22 43 25.392	2.9189	- 24	+19 08 40.91	18.997	+ 63
859	λ Pegasi	4.14	K0	22 44 30.290	2.8908	+ 39	+23 20 39.02	18.959	- 6
1597	68 Aquarii	5.43	G5	22 45 17.893	3.2204	- 73	-19 49 58.48	18.789	- 198
1598	B.D.-2° 5826 Aqr .	7.58	K2	22 45 19.995	+3.0887	+ 3	- 2 00 37.51	+18.991	+ 3
860	ε Gruis	3.69	A2	22 46 01.636	3.6178	+111	-51 32 17.44	18.949	- 59
861	τ Aquarii	4.21	K5	22 47 22.152	3.1748	- 10	-13 48 53.04	19.014	- 31
862	μ Pegasi	3.67	K0	22 47 58.367	2.8969	+107	+24 22 45.93	19.025	- 36
863	ι Cephei	3.68	K0	22 48 10.685	2.1379	-113	+65 58 45.40	18.948	- 118
1599	69 G. Gruis	5.39	K2	22 48 39.062	+3.4110	+ 18	-39 22 47.23	+19.073	- 7
864	λ Aquarii	3.84	M0	22 50 25.410	3.1286	+ 5	- 7 48 12.90	19.166	+ 40
865	ρ Indi	6.14	G0	22 51 45.990	4.1600	- 73	-70 17 55.20	19.235	+ 74
866	δ Aquarii	3.51	A2	22 52 25.365	3.1822	- 29	-16 02 40.69	19.157	- 20
1600	B.D.+36° 4956 Lac.	6.00	F2	22 53 05.157	+2.7922	+ 70	+36 51 09.39	19.209	+ 15
<i>N o</i>	36 H. Cephei	4.96	K5	22 54 49.17	-0.511	+ 59	+84 07 18.04	+19.270	+ 34
867	α Piscis Aust.* . .	1.29	A3	22 55 20.038	+3.3126	+ 258	-29 50 43.01	19.091	- 159
868	ζ Gruis	4.18	G5	22 58 24.624	3.5362	- 74	-52 58 47.12	19.319	- 4
869	ο Andromedæ . . .	3.63	B5, A2 _p	22 59 58.977	2.7628	+ 18	+42 06 00.12	19.361	+ 2
1601	π Piscis Austrini .	5.13	F0	23 01 10.593	3.3159	+ 53	-34 58 36.73	19.475	+ 89
870	β Pegasi	2.61	M0	23 01 44.052	+2.9100	+142	+27 51 16.84	+19.542	+ 143
1602	β Piscium	4.58	B5 _p	23 01 44.288	3.0529	+ 6	+ 3 35 36.97	19.396	- 3
871	α Pegasi	2.57	A0	23 02 39.974	2.9891	+ 42	+14 58 44.18	19.382	- 36
1603	55 Pegasi	4.69	M0	23 04 53.199	3.0225	+ 5	+ 9 10 56.17	19.457	- 8
1604	5 Andromedæ . . .	5.83	F0	23 05 50.487	2.7280	+152	+49 04 00.39	19.624	+ 139
873	88 Aquarii*	3.80	K0	23 07 12.558	+3.1968	+ 39	-21 24 02.41	+19.553	+ 40
1605	ι Gruis	4.10	K0	23 07 59.285	3.3913	+124	-45 28 28.09	19.511	- 18
1606	59 Pegasi	5.15	A3	23 09 36.843	3.0292	- 7	+ 8 29 30.15	19.559	- 1
875	Br. 3077 Cas	5.65	K2	23 11 14.990	2.8931	+2529	+56 56 10.54	19.891	+ 300
1607	φ Aquarii	4.40	M0	23 12 08.824	3.1063	+ 24	- 6 16 32.54	19.417	- 190
1608	ψ ¹ Aquarii	4.48	K0	23 13 41.497	+3.1425	+ 251	- 9 19 00.69	+19.624	- 11
876	25 G. Tucanæ	5.69	G0	23 14 27.073	3.5992	+ 251	-62 13 49.79	19.624	- 24
878	γ Piscium	3.85	K0	23 14 59.212	3.1101	+ 506	+ 3 03 09.20	19.681	+ 25
877	γ Tucanæ	4.10	F2	23 14 59.421	3.4942	- 38	-58 27 58.21	19.751	+ 94
879	γ Sculptoris	4.51	K0	23 16 33.609	3.2371	+ 18	-32 45 39.68	19.623	- 61
1609	ψ ³ Aquarii*	5.16	A0	23 16 46.613	+3.1199	+ 30	- 9 50 26.18	+19.691	+ 4
880	τ Pegasi	4.65	A5	23 18 33.268	2.9711	+ 21	+23 30 36.85	19.713	- 2
1610	12 Andromedæ . . .	5.75	F5	23 18 51.248	2.8977	+103	+37 57 09.66	19.654	- 66
1611	11 G. Sculptoris . .	5.81	G5	23 19 01.407	+3.1946	- 10	-27 13 01.56	+19.711	- 12

No. 867: *Fomalhaut*.
No. 873: *c² Aquarii*.No. 1609: 9^m.7, 1^s.1, 180°.

MEAN PLACES OF STARS, 1958.0
FOR JANUARY 0^d.861 UNIVERSAL TIME
(The Annual Variations are for the middle of the year)

Cat. No.	Star	Mag.	Spectrum	Right Ascension	Annual Variation	Annual Proper Motion	Declination	Annual Variation	Annual Proper Motion
				h m s	s	(0 ^o .0001)	° ' "	"	(0 ^o .001)
1612	98 Aquarii	4.20	K0	23 20 45.970	+3.1490	- 87	-20 19 48.20	+19.661	- 88
<i>S k</i>	τ Octantis	5.56	K0	23 22 31.31	8.531	+ 26	-87 42 49.21	19.787	+ 12
1613	67 Pegasi	5.46	A0	23 22 47.155	2.9386	+ 8	+32 09 14.14	19.783	+ 4
882	4 Cassiopeiae . . .	5.20	K5	23 22 57.653	2.6691	+ 7	+62 03 07.57	19.775	- 6
881	ν Pegasi	4.57	G0	23 23 16.755	2.9960	+ 137	+23 10 21.72	19.828	+ 42
883	α Gruis	5.54	F0	23 24 16.004	+3.3506	+ 25	-52 57 15.50	+19.932	+ 133
884	κ Piscium	4.94	A2 p	23 24 46.685	3.0753	+ 56	+ 1 01 31.74	19.716	- 90
1614	θ Piscium	4.45	G5	23 25 50.151	3.0437	- 84	+ 6 08 53.04	19.780	- 40
1615	B.D.+15° 4830 Peg .	6.98	A2	23 26 55.278	3.0193	+ 1	+15 46 51.85	19.843	+ 9
885	70 Pegasi	4.67	K0	23 27 01.684	3.0350	+ 42	+12 31 43.61	19.874	+ 39
886	β Sculptoris . . .	4.46	B9	23 30 43.404	+3.2138	+ 73	-38 03 03.09	+19.900	+ 21
1616	15 Andromedæ . .	5.50	A0	23 32 33.877	2.9381	- 15	+40 00 17.29	19.860	- 38
1617	ι Phœnicis	4.80	A2 p	23 32 49.288	3.2234	+ 35	-42 50 50.86	19.909	+ 8
888	248 G. Aquarii . .	6.51	K0	23 33 22.049	3.0941	- 3	- 7 41 49.13	19.932	+ 25
890	λ Andromedæ . .	4.00	K0	23 35 30.023	2.9400	+ 152	+46 13 49.93	19.512	- 416
889	11 G. Phœnicis . .	4.86	A2	23 35 35.682	+3.2253	+ 63	-45 43 29.48	+19.924	- 5
891	ι Andromedæ . . .	4.28	B8	23 36 04.160	2.9459	+ 23	+43 02 07.63	19.935	+ 3
893	γ Cephei	3.42	K0	23 37 36.178	2.4692	- 215	+77 23 52.69	20.104	+ 157
892	ι Piscium	4.28	F8	23 37 47.287	3.0862	+ 250	+ 5 23 54.72	19.516	- 432
1619	κ Andromedæ . .	4.33	A0	23 38 19.917	2.9586	+ 73	+44 06 04.65	19.937	- 15
1618	μ Sculptoris . . .	5.33	K0	23 38 26.103	+3.1453	- 74	-32 18 19.65	+19.905	- 49
1620	λ Piscium	4.61	A5	23 39 54.124	3.0615	- 88	+ 1 32 56.07	19.822	- 144
894	ω^2 Aquarii	4.62	A0	23 40 32.684	3.1098	+ 66	-14 46 38.28	19.906	- 64
1621	106 Aquarii	5.26	B8	23 42 01.441	3.1104	+ 19	-18 30 36.26	19.986	+ 6
1622	ψ Andromedæ . .	5.09	K0, A5	23 43 56.673	2.9767	+ 7	+46 11 13.43	19.992	- 1
1623	20 Piscium	5.60	K0	23 45 46.920	+3.0838	+ 60	- 2 59 42.41	+20.015	+ 12
895	41 H. Cephei . . .	5.02	A0	23 45 53.224	2.8759	+ 13	+67 34 24.36	20.007	+ 3
896	δ Sculptoris . . .	4.64	A0	23 46 44.462	3.1231	+ 81	-28 21 45.34	19.909	- 100
1624	Pi. 23 ^b 194 Aqr . .	7.14	K0	23 47 15.667	3.1028	- 3	-21 50 51.64	20.023	+ 12
897	268 G. Aquarii . . .	6.08	K0	23 48 04.684	3.0952	+ 92	-10 12 31.42	20.093	+ 79
898	ϕ Pegasi	5.23	M0	23 50 20.853	+3.0537	- 5	+18 53 13.29	+19.994	- 30
1625	82 Pegasi	5.39	A3	23 50 28.423	3.0613	- 16	+10 42 49.17	20.032	+ 7
899	ρ Cassiopeiae* . .	Var.	F8 p	23 52 16.419	3.0029	- 7	+57 15 56.87	20.035	+ 5
1626	27 G. Phœnicis . .	6.01	F8	23 52 26.726	3.1429	+ 320	-40 32 03.24	20.065	+ 34
1627	Grb.4163 Cephei . .	6.57	B9	23.52 45.449	2.9224	- 26	+74 10 35.45	20.031	- 1
<i>N</i> π	<i>V</i> Cephei	6.42	A0	23 54 26.55	+2.838	+ 26	+82 57 26.80	+20.054	+ 18
1628	Pi. 23 ^b 235 Pegasi .	6.30	M0	23 54 32.842	3.0587	- 16	+22 24 52.02	20.041	+ 4
1629	ψ Pegasi	4.75	M0	23 55 36.834	3.0589	- 27	+24 54 28.89	20.013	- 25
900	27 Piscium*	5.07	K0	23 56 31.340	3.0715	- 33	- 3 47 20.33	19.974	- 66
901	π Phœnicis	5.14	K0	23 56 45.597	3.1039	+ 56	-52 58 49.45	20.109	+ 69
902	ω Piscium	4.03	F5	23 57 09.146	+3.0817	+ 101	+ 6 37 50.91	+19.932	- 108
903	ϵ Tucanæ	4.71	B9	23 57 44.889	3.1112	+ 89	-65 48 38.78	20.022	- 19
904	θ Octantis	4.73	K0	23 59 27.986	3.0716	- 150	-77 17 50.56	19.882	- 160
1630	30 Piscium	4.66	M3	23 59 48.340	+3.0769	+ 34	- 6 14 50.68	+20.009	- 33

No. 899: 4^m.4 to 5^m.1.

No. 900: 9^m.0, 1^o.5, 280°.

PART III

ECLIPSES AND OCCULTATIONS

In the year 1958 there will be three eclipses, two of the Sun and one of the Moon.

I.—*An Annular Eclipse of the Sun*, April 19, 1958, invisible at Washington.

ELEMENTS OF THE ECLIPSE

Universal Time of $\odot$ in right ascension, April				d h m s			
				19	03	35	26.9
Sun and Moon's R. A.	h	m	s	Hourly motions			
	1	46	13.72	9.30 and 117.27			
	°	'	"				
Sun's declination	+10	58	17.9	Hourly motion			
Moon's declination	+11	13	40.6	Hourly motion			
Sun's equa. hor. parallax			8.8	Sun's true semidiameter			
Moon's equa. hor. parallax	54	11.4		Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE

	Universal Time	Longitude from Greenwich	Latitude
	d h m	° ' "	° ' "
Eclipse begins	April 19 00 24.1	- 84 45	- 4 57
Central eclipse begins	19 01 33.0	- 66 25	+ 0 50
Central eclipse at local apparent noon	19 03 35.4	-125 58	+27 40
Central eclipse ends	19 05 20.3	+163 40	+30 33
Eclipse ends	19 06 29.1	-177 41	+24 48

II.—*A Partial Eclipse of the Moon*, May 3, 1958, invisible at Washington; the beginning visible generally in the western part of North America, the Pacific Ocean, eastern Asia, the southeastern part of the Indian Ocean, Australia, and Antarctica; the ending visible generally in the extreme western part of North America, the Pacific Ocean, eastern Asia, Australia, the southeastern part of the Indian Ocean, and Antarctica.

ELEMENTS OF THE ECLIPSE

Universal Time of $\odot$ in right ascension, May				d h m s			
				3	11	50	01.9
Sun's right ascension	h	m	s	Hourly motion			
	2	40	22.11	9.58			
Moon's right ascension	14	40	22.11	Hourly motion			
	°	'	"				
Sun's declination	+15	36	10.2	Hourly motion			
Moon's declination	-14	32	51.7	Hourly motion			
Sun's equa. hor. parallax			8.7	Sun's true semidiameter			
Moon's equa. hor. parallax	60	45.3		Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE

	May	d h m	
			Universal Time
Moon enters penumbra	3	10 09.9	} Universal Time
Moon enters umbra	3	11 59.6	
Middle of the eclipse	3	12 12.9	
Moon leaves umbra	3	12 26.1	
Moon leaves penumbra	3	14 15.9	

The Moon being in the Zenith			
Contacts of Umbra with Moon's Limb	Angles of Position from the North Point	in Longitude from Greenwich	and in Latitude
	°	° ' "	° ' "
First	175 to W.	-179 25	-14 34
Last	161 to W.	-173 02	-14 38

Magnitude of the Eclipse = 0.015 (Moon's diameter = 1.0)

III.—*A Total Eclipse of the Sun*, October 12, 1958, invisible at Washington.

ELEMENTS OF THE ECLIPSE

Universal Time of $\odot$ in right ascension, October							
				d	h	m	s
Sun and Moon's R. A.				12	21	03	55.0
	h	m	s				
	13	10	13.95	Hourly motions			
	°	'	"	9.24 and 147.44			
Sun's declination	-7	27	09.2	Hourly motion			
Moon's declination	-7	46	01.1	Hourly motion			
Sun's equa. hor. parallax	8.8			Sun's true semidiameter			
Moon's equa. hor. parallax	61	23.8		Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE

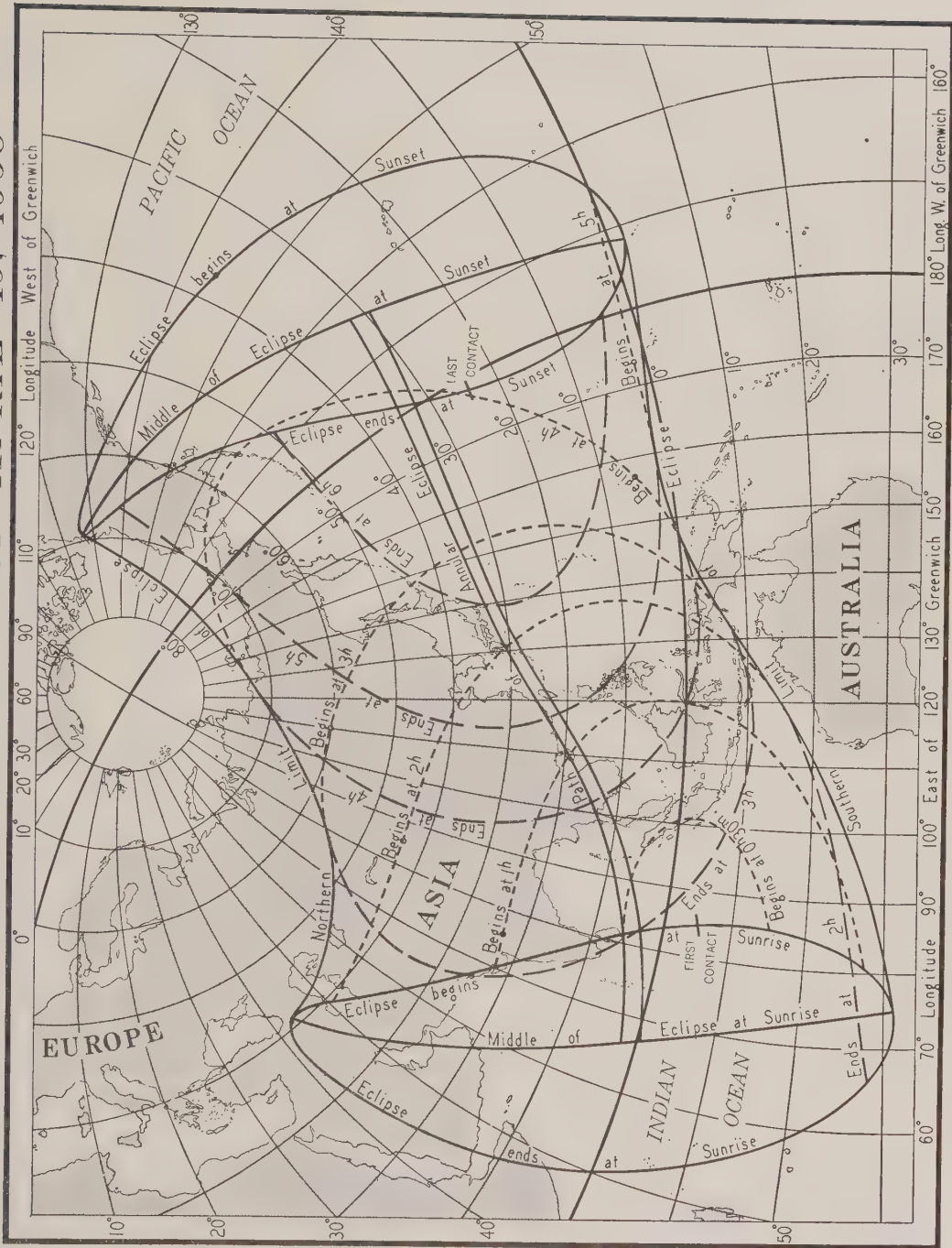
		Universal Time			Longitude from Greenwich		Latitude	
		d	h	m	°	'	°	'
Eclipse begins	October	12	18	19.9	-172	23	+ 5	33
Central eclipse begins		12	19	16.6	-157	26	- 0	31
Central eclipse at local apparent noon		12	21	03.9	+139	21	-25	33
Central eclipse ends		12	22	33.0	+ 66	37	-33	39
Eclipse ends		12	23	29.7	+ 81	52	-27	36

BESSELIAN ELEMENTS OF THE ANNULAR ECLIPSE OF THE SUN
APRIL 19, 1958

Universal Time	Coordinates of Center of Shadow on Fundamental Plane		Direction of Axis of Shadow			Radius of Penumbra and Umbra on Fundamental Plane	
	<i>x</i>	<i>y</i>	Sin <i>d</i>	Cos <i>d</i>	μ ° ' "	<i>l</i> ₁	<i>l</i> ₂
h m 0 20	-1.595370	-0.146089	+0.189520	0.981877	185 10 04.5	0.567711	+0.021685
	1.513774	0.124024	0.189561	0.981869	187 40 06.6	0.567713	0.021687
	1.432174	0.101962	0.189601	0.981861	190 10 08.7	0.567714	0.021688
	1.350570	0.079903	0.189642	0.981853	192 40 10.8	0.567715	0.021689
1 00	-1.268962	-0.057847	+0.189682	0.981846	195 10 12.9	0.567715	+0.021689
	1.187350	0.035795	0.189723	0.981838	197 40 15.1	0.567715	0.021689
	1.105735	-0.013747	0.189763	0.981830	200 10 17.2	0.567714	0.021688
	1.024116	+0.008298	0.189804	0.981822	202 40 19.3	0.567712	0.021687
	0.942494	0.030339	0.189844	0.981814	205 10 21.4	0.567710	0.021685
	0.860869	0.052377	0.189885	0.981806	207 40 23.5	0.567708	0.021683
2 00	-0.779241	+0.074412	+0.189925	0.981799	210 10 25.6	0.567705	+0.021680
	0.697611	0.096443	0.189966	0.981791	212 40 27.8	0.567701	0.021676
	0.615978	0.118471	0.190006	0.981783	215 10 29.9	0.567697	0.021672
	0.534343	0.140495	0.190046	0.981775	217 40 32.0	0.567692	0.021667
	0.452705	0.162516	0.190087	0.981767	220 10 34.1	0.567687	0.021662
	0.371065	0.184533	0.190127	0.981759	222 40 36.2	0.567681	0.021656
3 00	-0.289423	+0.206547	+0.190168	0.981752	225 10 38.3	0.567675	+0.021650
	0.207779	0.228556	0.190208	0.981744	227 40 40.4	0.567668	0.021643
	0.126133	0.250562	0.190249	0.981736	230 10 42.6	0.567661	0.021636
	-0.044485	0.272564	0.190289	0.981728	232 40 44.7	0.567653	0.021628
	+0.037164	0.294562	0.190330	0.981720	235 10 46.8	0.567644	0.021619
	0.118814	0.316556	0.190370	0.981712	237 40 48.9	0.567635	0.021610
4 00	+0.200465	+0.338547	+0.190411	0.981705	240 10 51.0	0.567626	+0.021601
	0.282117	0.360534	0.190451	0.981697	242 40 53.1	0.567616	0.021591
	0.363770	0.382517	0.190492	0.981689	245 10 55.2	0.567605	0.021580
	0.445423	0.404497	0.190532	0.981681	247 40 57.4	0.567594	0.021569
	0.527077	0.426472	0.190572	0.981673	250 10 59.5	0.567582	0.021557
	0.608732	0.448443	0.190613	0.981665	252 41 01.6	0.567569	0.021545
5 00	+0.690386	+0.470410	+0.190653	0.981657	255 11 03.7	0.567556	+0.021532
	0.772040	0.492372	0.190694	0.981650	257 41 05.8	0.567543	0.021518
	0.853695	0.514330	0.190734	0.981642	260 11 07.9	0.567529	0.021504
	0.935349	0.536283	0.190775	0.981634	262 41 10.0	0.567514	0.021490
	1.017002	0.558232	0.190815	0.981626	265 11 12.1	0.567499	0.021475
	1.098655	0.580176	0.190855	0.981618	267 41 14.2	0.567483	0.021459
6 00	+1.180307	+0.602116	+0.190896	0.981610	270 11 16.4	0.567467	+0.021443
	1.261958	0.624052	0.190936	0.981602	272 41 18.5	0.567451	0.021427
	1.343608	0.645983	0.190977	0.981595	275 11 20.6	0.567434	0.021410
	+1.425257	+0.667910	+0.191017	0.981587	277 41 22.7	0.567416	+0.021392

Universal Time	<i>x'</i> for 1 Minute	<i>y'</i> for 1 Minute	μ' for 1 Minute	Tangents of Angles of Cones	
				Penumbra	Umbra
h m 0 00	0.0081585	+0.0022073	15.0035	0.0046560	0.0046328
	0.0081610	+0.0022054	15.0035	0.0046560	0.0046328
1 00	0.0081629	+0.0022033	15.0035	0.0046559	0.0046327
2 00	0.0081643	+0.0022012	15.0035	0.0046559	0.0046327
3 00	0.0081651	+0.0021989	15.0035	0.0046558	0.0046326
4 00	0.0081654	+0.0021964	15.0035	0.0046558	0.0046326
5 00	0.0081651	+0.0021938	15.0035	0.0046557	0.0046325
6 00	0.0081643	+0.0021911	15.0035	0.0046556	0.0046325

ANNULAR ECLIPSE OF APRIL 19, 1958



Note: The hours of beginning and ending are expressed in Universal Time.

PATH OF ANNULAR PHASE DURING THE ECLIPSE OF THE SUN
APRIL 19, 1958

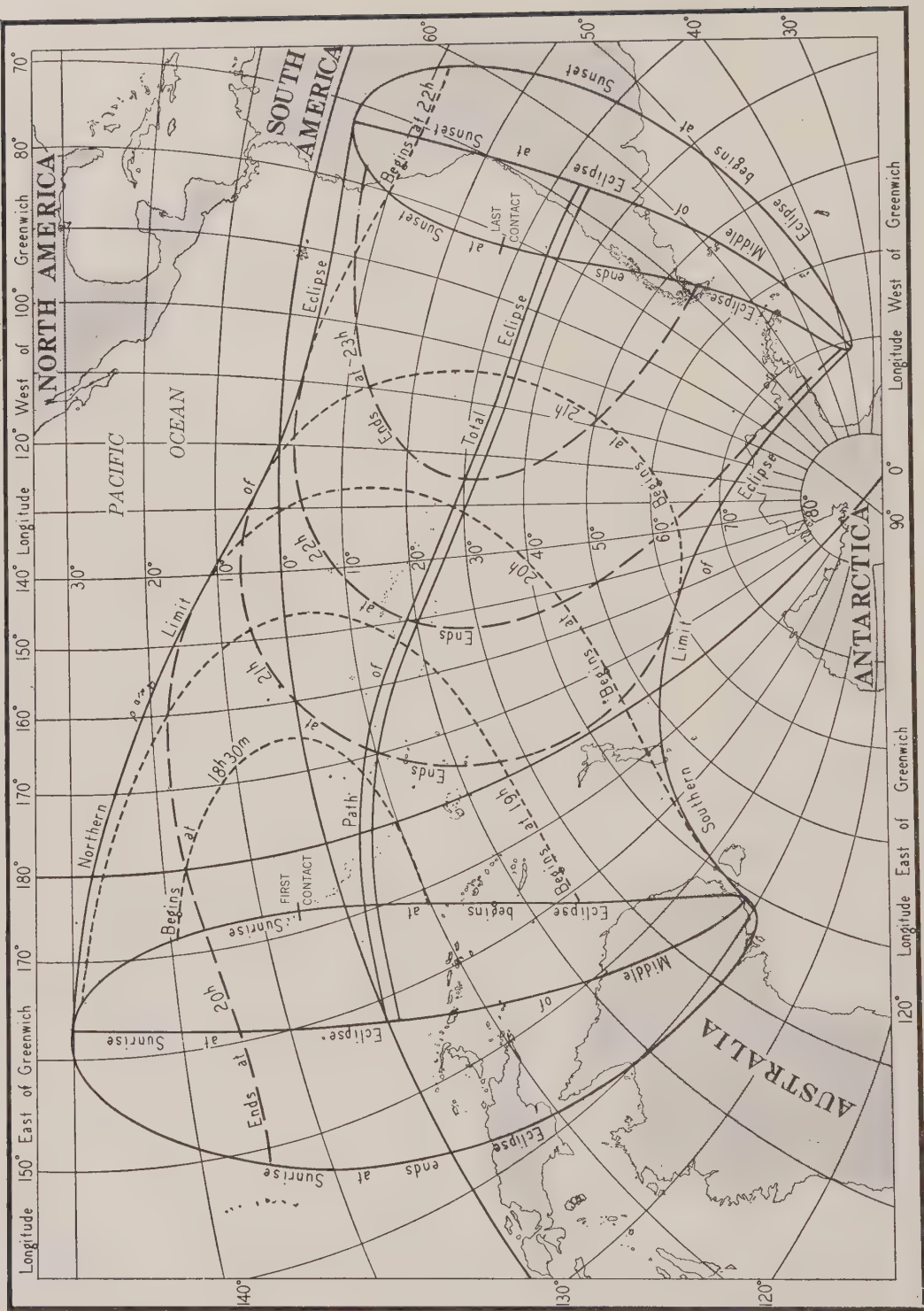
Universal Time	Northern Limit		Central Line		Southern Limit		Duration of Annular Phase on Central Line
	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	
Limits	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	m s
1 ^h 35 ^m	+ 2 07	- 65 56	+ 0 50	- 66 25	- 0 26	- 66 54	5 12.9
40	3 36.5	72 52.4	3 04.6	76 06.5	+ 2 26.1	78 36.6	5 27.0
45	6 08.5	81 53.6	5 22.2	83 38.0	4 35.5	85 14.1	5 37.3
50	7 52.9	86 52.2	7 04.4	88 16.3	6 16.0	89 36.0	5 46.1
55	9 21.6	90 34.9	8 32.4	91 48.9	7 43.4	92 59.8	5 53.9
	10 41.5	93 37.0	9 52.0	94 44.5	9 02.9	95 49.8	
2 00	+11 55.4	- 96 13.0	+11 05.8	- 97 16.0	+10 16.7	- 98 17.0	6 01.1
05	13 04.9	98 30.8	12 15.3	99 30.3	11 26.3	100 28.1	6 07.8
10	14 11.0	100 35.1	13 21.4	101 31.7	12 32.3	102 27.0	6 14.0
15	15 14.2	102 29.0	14 24.6	103 23.3	13 35.5	104 16.3	6 19.9
20	16 15.0	104 14.9	15 25.4	105 07.2	14 36.3	105 58.3	6 25.4
25	17 13.8	105 54.4	16 24.1	106 44.9	15 34.9	107 34.3	6 30.6
30	+18 10.7	-107 28.8	+17 20.9	-108 17.6	+16 31.6	-109 05.5	6 35.5
35	19 06.0	108 59.1	18 16.0	109 46.3	17 26.6	110 32.8	6 40.1
40	19 59.8	110 26.1	19 09.6	111 11.9	18 20.0	111 57.0	6 44.3
45	20 52.2	111 50.5	20 01.8	112 35.0	19 11.9	113 18.7	6 48.2
50	21 43.2	113 12.9	20 52.6	113 56.1	20 02.4	114 38.5	6 51.8
55	22 33.1	114 33.9	21 42.1	115 15.8	20 51.6	115 57.0	6 55.0
3 00	+23 21.8	-115 53.9	+22 30.4	-116 34.5	+21 39.6	-117 14.5	6 57.9
05	24 09.4	117 13.3	23 17.6	117 52.6	22 26.3	118 31.4	7 00.4
10	24 55.9	118 32.6	24 03.6	119 10.6	23 11.8	119 48.1	7 02.5
15	25 41.3	119 52.1	24 48.5	120 28.8	23 56.1	121 04.9	7 04.3
20	26 25.6	121 12.2	25 32.3	121 47.5	24 39.3	122 22.3	7 05.7
25	27 08.9	122 33.2	26 14.9	123 07.0	25 21.4	123 40.4	7 06.6
30	+27 51.1	-123 55.4	+26 56.5	-124 27.8	+26 02.3	-124 59.7	7 07.1
35	28 32.2	125 19.3	27 36.9	125 50.1	26 42.0	126 20.5	7 07.2
40	29 12.2	126 45.2	28 16.1	127 14.2	27 20.5	127 43.0	7 06.8
45	29 51.0	128 13.4	28 54.2	128 40.6	27 57.8	129 07.6	7 06.0
50	30 28.6	129 44.3	29 31.0	130 09.6	28 33.9	130 34.8	7 04.7
55	31 04.9	131 18.4	30 06.5	131 41.7	29 08.6	132 04.8	7 02.9
4 00	+31 39.9	-132 56.2	+30 40.7	-133 17.2	+29 41.9	-133 38.1	7 00.6
05	32 13.5	134 38.0	31 13.4	134 56.6	30 13.8	135 15.2	6 57.9
10	32 45.6	136 24.6	31 44.6	136 40.5	30 44.1	136 56.5	6 54.6
15	33 16.0	138 16.5	32 14.1	138 29.4	31 12.8	138 42.6	6 50.9
20	33 44.6	140 14.4	32 41.8	140 24.1	31 39.6	140 34.4	6 46.8
25	34 11.2	142 19.2	33 07.5	142 25.5	32 04.4	142 32.4	6 42.1
30	+34 35.5	-144 32.1	+33 31.0	-144 34.4	+32 27.1	-144 37.6	6 36.9
35	34 57.4	146 54.2	33 52.0	146 52.2	32 47.3	146 51.2	6 31.3
40	35 16.3	149 27.3	34 10.2	149 20.3	33 04.7	149 14.7	6 25.1
45	35 32.0	152 13.5	34 25.1	152 00.8	33 18.9	151 49.9	6 18.5
50	35 43.6	155 15.8	34 36.1	154 56.4	33 29.2	154 39.4	6 11.3
55	35 50.3	158 38.3	34 42.3	158 11.0	33 35.0	157 46.7	6 03.5
5 00	+35 50.6	-162 27.7	+34 42.5	-161 50.4	+33 35.0	-161 17.1	5 55.1
05	35 42.3	166 55.1	34 34.5	166 04.6	33 27.2	165 19.5	5 45.8
10	35 20.8	172 23.0	34 14.4	171 12.4	33 08.1	170 10.0	5 35.3
15	34 33.6	-179 52.9	33 32.3	-178 01.6	32 29.7	-176 27.0	5 22.7
20	...	...	31 24.8	+168 11.5	30 56.4	+172 57.9	5 01.6
Limits	+31 49	+163 05	+30 33	+163 40	+29 19	+164 14	...

BESELIAN ELEMENTS OF THE TOTAL ECLIPSE OF THE SUN
OCTOBER 12, 1958

Universal Time	Coordinates of Center of Shadow on Fundamental Plane		Direction of Axis of Shadow			Radius of Penumbra and Umbra on Fundamental Plane	
	x	y	Sin d	Cos d	μ	l_1	l_2
h m					° ' "		
18 10	-1.619830	+0.176308	-0.128928	0.991654	95 51 28.5	0.534586	-0.011275
20	1.526725	0.148438	0.128972	0.991648	98 21 30.9	0.534596	0.011265
30	1.433614	0.120570	0.129016	0.991643	100 51 33.2	0.534605	0.011256
40	1.340498	0.092705	0.129060	0.991637	103 21 35.6	0.534613	0.011248
50	1.247377	0.064843	0.129104	0.991631	105 51 38.0	0.534621	0.011240
19 00	-1.154251	+0.036983	-0.129148	0.991625	108 21 40.3	0.534628	-0.011233
10	1.061121	+0.009125	0.129191	0.991620	110 51 42.7	0.534634	0.011227
20	0.967987	-0.018729	0.129235	0.991614	113 21 45.1	0.534639	0.011222
30	0.874849	0.046581	0.129279	0.991608	115 51 47.4	0.534644	0.011217
40	0.781708	0.074430	0.129323	0.991602	118 21 49.8	0.534648	0.011213
50	0.688564	0.102277	0.129367	0.991597	120 51 52.2	0.534651	0.011210
20 00	-0.595416	-0.130120	-0.129411	0.991591	123 21 54.5	0.534653	-0.011208
10	0.502266	0.157961	0.129455	0.991585	125 51 56.9	0.534655	0.011206
20	0.409115	0.185799	0.129499	0.991580	128 21 59.3	0.534656	0.011205
30	0.315962	0.213634	0.129543	0.991574	130 52 01.6	0.534656	0.011204
40	0.222807	0.241465	0.129587	0.991568	133 22 04.0	0.534656	0.011205
50	0.129650	0.269293	0.129631	0.991562	135 52 06.4	0.534655	0.011206
21 00	-0.036492	-0.297118	-0.129675	0.991557	138 22 08.7	0.534653	-0.011208
10	+0.056667	0.324939	0.129719	0.991551	140 52 11.1	0.534650	0.011210
20	0.149827	0.352756	0.129763	0.991545	143 22 13.5	0.534647	0.011213
30	0.242987	0.380569	0.129807	0.991539	145 52 15.8	0.534643	0.011217
40	0.336148	0.408379	0.129851	0.991534	148 22 18.2	0.534638	0.011222
50	0.429308	0.436185	0.129895	0.991528	150 52 20.6	0.534633	0.011228
22 00	+0.522469	-0.463987	-0.129939	0.991522	153 22 22.9	0.534627	-0.011234
10	0.615629	0.491786	0.129983	0.991516	155 52 25.3	0.534620	0.011241
20	0.708789	0.519580	0.130027	0.991510	158 22 27.7	0.534612	0.011249
30	0.801947	0.547370	0.130071	0.991505	160 52 30.0	0.534604	0.011257
40	0.895104	0.575156	0.130115	0.991499	163 22 32.4	0.534595	0.011266
50	0.988259	0.602937	0.130159	0.991493	165 52 34.7	0.534585	0.011276
23 00	+1.081413	-0.630713	-0.130202	0.991487	168 22 37.1	0.534575	-0.011286
10	1.174564	0.658485	0.130246	0.991482	170 52 39.5	0.534563	0.011297
20	1.267713	0.686253	0.130290	0.991476	173 22 41.8	0.534551	0.011309
30	+1.360858	-0.714016	-0.130334	0.991470	175 52 44.2	0.534538	-0.011322

Universal Time	x' for 1 Minute	y' for 1 Minute	μ' for 1 Minute	Tangents of Angles of Cones	
				Penumbra	Umbra
h m					
18 00	0.0093096	-0.0027874	15.0039	0.0046855	0.0046622
19 00	0.0093128	-0.0027859	15.0039	0.0046856	0.0046622
20 00	0.0093149	-0.0027842	15.0039	0.0046856	0.0046623
21 00	0.0093159	-0.0027823	15.0039	0.0046857	0.0046624
22 00	0.0093160	-0.0027800	15.0039	0.0046858	0.0046624
23 00	0.0093152	-0.0027774	15.0039	0.0046858	0.0046625
0 00	0.0093133	-0.0027746	15.0039	0.0046859	0.0046625

TOTAL ECLIPSE OF OCTOBER 12, 1958



Note: The hours of beginning and ending are expressed in Universal Time

PATH OF TOTAL PHASE DURING THE ECLIPSE OF THE SUN
OCTOBER 12, 1958

Universal Time	Northern Limit		Central Line		Southern Limit		Duration of Total Phase on Central Line
	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	
Limits	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	m s
19 ^h 20 ^m	+ 0 09	-157 37	- 0 31	-157 26	- 1 12	-157 14	.. . . .
25	- 2 24.7	172 01.6	2 56.3	170 52.9	3 26.7	169 38.9	2 47.3
	4 10.1	-178 39.6	4 45.6	-177 46.9	5 20.4	-176 51.9	3 07.4
30	- 5 38.8	+176 43.8	- 6 16.3	+177 30.9	- 6 53.3	+178 19.7	3 23.0
35	6 59.3	173 03.5	7 38.2	173 47.8	8 16.7	174 33.3	3 36.3
40	8 14.6	169 57.3	8 54.6	170 39.7	9 34.3	171 23.2	3 48.2
45	9 26.1	167 13.9	10 07.1	167 55.1	10 47.8	168 37.1	3 58.9
50	10 34.8	164 47.2	11 16.6	165 27.3	11 58.2	166 08.3	4 08.7
55	11 41.2	162 32.9	12 23.7	163 12.1	13 06.1	163 52.2	4 17.7
20 00	-12 45.6	+160 28.2	-13 28.8	+161 06.7	-14 11.9	+161 46.0	4 25.9
05	13 48.3	158 31.0	14 32.2	159 08.9	15 16.0	159 47.4	4 33.4
10	14 49.6	156 39.8	15 34.1	157 17.0	16 18.5	157 54.8	4 40.2
15	15 49.5	154 53.3	16 34.7	155 29.8	17 19.7	156 06.9	4 46.3
20	16 48.3	153 10.4	17 34.0	153 46.2	18 19.6	154 22.6	4 51.8
25	17 46.0	151 30.3	18 32.2	152 05.4	19 18.4	152 41.0	4 56.6
30	-18 42.6	+149 52.2	-19 29.4	+150 26.6	-20 16.2	+151 01.4	5 00.7
35	19 38.3	148 15.4	20 25.6	148 49.0	21 13.0	149 23.0	5 04.1
40	20 33.0	146 39.4	21 20.9	147 12.1	22 08.9	147 45.2	5 06.8
45	21 26.9	145 03.6	22 15.3	145 35.4	23 03.8	146 07.5	5 08.8
50	22 19.9	143 27.5	23 08.8	143 58.2	23 57.9	144 29.2	5 10.1
55	23 12.0	141 50.5	24 01.4	142 20.0	24 51.1	142 49.9	5 10.7
21 00	-24 03.2	+140 12.0	-24 53.2	+140 40.4	-25 43.4	+141 09.0	5 10.6
05	24 53.6	138 31.6	25 44.1	138 58.7	26 34.8	139 25.9	5 09.8
10	25 43.1	136 48.8	26 34.1	137 14.4	27 25.3	137 40.0	5 08.3
15	26 31.7	135 02.9	27 23.1	135 26.8	28 14.8	135 50.8	5 06.0
20	27 19.3	133 13.2	28 11.2	133 35.4	29 03.3	133 57.6	5 03.0
25	28 05.9	131 19.2	28 58.2	131 39.5	29 50.7	131 59.6	4 59.2
30	-28 51.4	+129 19.9	-29 44.1	+129 38.1	-30 36.9	+129 56.0	4 54.7
35	29 35.8	127 14.5	30 28.7	127 30.4	31 21.8	127 45.8	4 49.4
40	30 18.8	125 01.9	31 11.9	125 15.2	32 05.3	125 28.0	4 43.4
45	31 00.3	122 40.9	31 53.6	122 51.3	32 47.2	123 01.1	4 36.6
50	31 40.1	120 09.8	32 33.5	120 17.1	33 27.1	120 23.5	4 29.1
55	32 18.0	117 26.6	33 11.3	117 30.4	34 04.9	117 33.1	4 20.7
22 00	-32 53.6	+114 28.8	-33 46.7	+114 28.6	-34 40.1	+114 27.0	4 11.5
05	33 26.4	111 12.8	34 19.1	111 07.9	35 12.0	111 01.4	4 01.4
10	33 55.6	107 33.4	34 47.7	107 23.0	35 39.9	107 10.7	3 50.2
15	34 20.2	103 22.4	35 11.2	103 05.4	36 02.4	102 46.1	3 37.9
20	34 38.2	98 26.1	35 27.7	98 00.4	36 17.1	97 31.7	3 23.9
25	34 45.6	92 15.5	35 32.5	91 36.7	36 19.1	90 53.6	3 07.6
30	-34 31.0	+ 83 23.9	-35 12.2	+ 82 15.4	-35 52.0	+ 80 57.2	2 46.2
Limits	-32 59	+ 66 51	-33 39	+ 66 37	-34 19	+ 66 23	.. . . .

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN
APRIL 19, 1958
UNIVERSAL TIME

Place	Beginning	<i>P</i>	<i>V</i>	Middle	Magni- tude	Ending	<i>P</i>	<i>V</i>
	h m	°	°	h m		h m	°	°
ALASKA:								
Anchorage	4 05	205	176	4 44	0.20	5 22	131	104
Fairbanks	4 06	198	173	4 39	0.13	5 11	137	114
Juneau	4 06	206	176	.. ..	[0.11] ¹	.. ..	...	...
Nome	4 00	203	177	4 41	0.18	5 20	132	106
HAWAII:								
Honolulu	4 20	274	204	.. ..	[0.43] ¹	.. ..	...	...

¹ Magnitude at Sunset. Mid-eclipse below horizon.

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN
OCTOBER 12, 1958
UNIVERSAL TIME

Place	Beginning	<i>P</i>	<i>V</i>	Middle	Magni- tude	Ending	<i>P</i>	<i>V</i>
	h m	°	°	h m		h m	°	°
SAMOA:								
Tutuila	18 40	303	45	19 47	0.88	21 04	109	214

MEAN PLACES FOR 1958.0 (January 0.861, Universal Time)

Cat. No.	Name of Star		Magni- tude	Right Ascension			Annual Proper Motion	Declination			Annual Proper Motion	
				h	m	s	s	°	'	"	"	
6		BD+2°4752	6.9	0	03	13.034	-0.0022	+	3	22	20.77	+0.014
29		BD+5°25	7.2	0	13	28.972	+0.0025		5	36	37.71	+0.003
30	72 G.	Piscium	7.0	0	13	47.796	+0.0011		4	01	04.17	-0.019
32	93 B.	Piscium	7.3	0	14	30.107	+0.0001		1	37	02.07	+0.025
53	87 G.	Piscium	6.9	0	24	06.875	+0.0010		3	35	35.97	+0.006
64	116 B.	Piscium	6.6	0	27	58.929	-0.0020	+	4	37	40.29	+0.010
68	51	Piscium	5.7	0	30	13.597	+0.0022		6	43	25.57	+0.008
98	60	Piscium	6.2	0	45	13.101	+0.0006		6	30	43.10	-0.014
103	62	Piscium	6.1	0	46	06.444	+0.0068		7	04	15.47	+0.009
104	147 B.	Piscium	5.8	0	46	10.634	+0.0505		5	03	53.95	-1.141
105	δ	Piscium	4.6	0	46	30.019	+0.0055	+	7	21	24.74	-0.045
132	169 B.	Piscium	6.9	0	56	08.545	+0.0016		6	37	04.64	+0.006
136	171 B.	Piscium	6.3	0	57	38.893	+0.0017		6	15	25.25	-0.004
143		BD+8°158	6.8	1	00	18.267	-0.0012		8	35	46.53	-0.021
145	180 B.	Piscium	6.7	1	00	30.894	+0.0038		8	54	27.52	-0.034
146	ε	Piscium	4.4	1	00	45.614	-0.0055	+	7	39	52.15	+0.030
148		BD+5°141	6.9	1	01	36.214	+0.0025		6	32	23.76	-0.003
162	192 B.	Piscium	6.9	1	04	26.289	-0.0041		8	08	10.19	-0.031
166	198 B.	Piscium	6.9	1	06	09.845	-0.0006		9	41	03.87	+0.006
173	210 B.	Piscium	6.6	1	09	16.751	+0.0015		10	04	08.88	+0.001
180	ζ	Piscium	5.6	1	11	32.009	+0.0094	+	7	21	13.69	-0.049
181		BD+6°175	6.5	1	11	33.501	+0.0105		7	21	23.73	-0.057
184	88	Piscium	6.2	1	12	31.143	-0.0005		6	46	24.74	-0.020
186	222 B.	Piscium	7.1	1	13	34.716	-0.0055		9	33	46.21	+0.040
201		BD+9°158	7.5	1	20	30.994	-0.0074		10	09	04.85	-0.093
203	241 B.	Piscium	6.9	1	20	40.407	+0.0032	+	11	08	52.67	-0.044
204	243 B.	Piscium	7.3	1	20	44.818	+0.0065		7	11	51.73	+0.250
209	254 B.	Piscium	7.2	1	23	45.252	+0.0021		10	11	20.28	+0.010
214	263 B.	Piscium	6.4	1	26	10.528	+0.0071		7	44	40.44	+0.011
226	269 B.	Piscium	6.6	1	31	05.896	+0.0006		7	59	38.06	-0.033
240	π	Piscium	5.6	1	34	52.087	-0.0045	+	11	55	38.62	+0.045
241	281 B.	Piscium	6.9	1	35	26.489	+0.0082		11	51	53.64	+0.009
247	288 B.	Piscium	6.7	1	38	22.003	+0.0051		8	32	54.78	+0.015
252		BD+9°206	7.4	1	40	22.355	-0.0029		10	02	00.89	-0.016
257	ο	Piscium	4.5	1	43	10.337	+0.0050		8	56	49.69	+0.055
264	300 B.	Piscium	7.0	1	44	55.161	+0.0003	+	10	38	06.36	-0.004
272	54	Ceti	5.9	1	48	37.996	-0.0049		10	50	10.21	-0.024
279		BD+11°248	7.1	1	51	14.910	-0.0018		12	28	35.48	-0.037
284		BD+10°257	7.4	1	52	10.050	+0.0013		11	11	48.21	+0.025
290	26 B.	Arietis	6.1	1	57	10.687	0.0000		12	05	31.09	-0.035
299	12 H ¹ .	Arietis	6.3	2	00	19.151	-0.0005	+	13	16	30.02	0.000
301	34 B.	Arietis	6.8	2	00	42.915	+0.0013		10	49	02.40	+0.016
325		BD+13°351	7.4	2	10	25.898	+0.0016		13	43	20.34	+0.009
340		BD+12°317	7.1	2	16	35.157	+0.0137		12	47	56.19	+0.041
355		BD+11°335	7.5	2	23	18.129	-0.0089		11	47	07.58	-0.290
374	29	Arietis	6.1	2	30	35.853	-0.0012	+	14	50	59.20	+0.047
380		BD+13°411	7.4	2	33	43.523	+0.0016		13	34	21.81	-0.005
384	31	Arietis	5.7	2	34	20.205	+0.0189		12	15	59.73	-0.082
391		BD+14°439	7.4	2	36	41.164	+0.0019		14	40	47.91	-0.014
403	ο	Arietis	5.8	2	42	13.789	-0.0003	+	15	08	06.73	-0.011

MEAN PLACES FOR 1958.0 (January 0.861, Universal Time)

Cat. No.	Name of Star	Magni- tude	Right Ascension			Annual Proper Motion	Declination			Annual Proper Motion
			h	m	s		°	'	"	
413	BD+14°469 . . .	6.8	2	45	39.923	+0.0007	+15	20	01.42	-0.032
422	σ Arietis	5.5	2	49	10.174	+0.0022	14	54	36.70	-0.021
423	124 B. Arietis	6.4	2	50	51.079	+0.0045	16	18	47.79	-0.053
434	BD+15°414 . . .	6.9	2	55	07.906	+0.0049	16	07	34.15	-0.043
437	BD+13°484 . . .	7.4	2	56	26.910	+0.0018	13	26	17.82	-0.081
445	BD+14°502 . . .	7.3	2	58	33.891	-0.0060	+14	51	59.36	-0.067
450	145 B. Arietis	6.6	3	02	20.166	-0.0005	15	41	40.07	-0.079
466	BD+15°447 . . .	7.3	3	10	03.486	-0.0002	16	21	35.39	-0.017
469	BD+15°450 . . .	7.3	3	11	47.582	+0.0020	15	26	05.25	-0.015
504	BD+14°565 . . .	7.3	3	26	37.513	+0.0014	14	51	10.39	-0.013
505	BD+16°450 . . .	7.0	3	27	20.044	+0.0013	+16	37	08.03	-0.024
510	BD+17°564 . . .	7.2	3	28	57.633	-0.0012	17	47	45.65	+0.004
517	26 B. Tauri	6.4	3	31	44.531	+0.0065	17	41	47.38	-0.306
523	30 B. Tauri	6.5	3	35	26.144	+0.0018	15	17	38.68	-0.019
527	33 B. Tauri	6.3	3	37	02.955	+0.0029	16	24	05.23	-0.032
532	BD+16°497 . . .	7.2	3	40	13.817	-0.0080	+17	09	36.72	+0.034
577	148 B. Tauri	6.0	3	50	45.666	+0.0097	17	12	12.48	-0.030
581	150 B. Tauri	6.9	3	52	04.018	+0.0158	16	29	41.67	-0.192
590	162 B. Tauri	6.3	3	58	12.665	0.0000	17	10	46.75	-0.027
593	163 B. Tauri	5.8	3	58	23.333	+0.0093	18	04	37.41	-0.027
600	173 B. Tauri	6.8	4	02	15.098	-0.0025	+17	24	13.82	+0.018
609	BD+16°559 . . .	7.5	4	05	30.885	-0.0007	16	25	11.36	-0.012
610	180 B. Tauri	6.2	4	05	34.882	+0.0010	17	13	44.92	-0.011
614	43 Tauri	5.7	4	06	42.917	+0.0078	19	29	58.97	-0.033
617	188 B. Tauri	6.6	4	08	16.301	+0.0079	18	18	54.33	-0.037
620	193 B. Tauri	6.3	4	10	06.601	+0.0039	+17	10	15.40	-0.018
629	BD+17°703 . . .	7.5	4	15	35.753	+0.0084	18	09	19.26	-0.033
636	55 Tauri <i>m</i>	6.9	4	17	30.354	+0.0081	16	25	21.99	-0.037
639	85 H ¹ Tauri	6.0	4	17	58.439	+0.0080	18	38	36.86	-0.032
643	BD+18°629 . . .	6.7	4	19	05.890	+0.0078	18	19	09.93	-0.038
648	δ Tauri	3.9	4	20	30.536	+0.0074	+17	26	44.17	-0.028
653	64 Tauri	4.8	4	21	40.285	+0.0090	17	20	53.54	-0.041
654	234 B. Tauri	6.0	4	22	30.019	+0.0074	18	56	49.13	-0.039
658	68 Tauri	4.2	4	23	03.363	+0.0078	17	50	01.09	-0.024
663	BD+17°724 . . .	6.9	4	24	38.789	-0.0009	18	06	51.69	-0.014
668	ϵ Tauri	3.6	4	26	09.624	+0.0076	+19	05	20.14	-0.034
684	119 H ¹ Tauri <i>m</i>	6.2	4	31	06.856	+0.0008	17	55	47.02	-0.019
691	282 B. Tauri	6.6	4	33	14.591	-0.0020	19	47	48.67	-0.006
697	BD+18°661 (<i>var.</i>) . . .	7.2-7.4	4	34	48.138	+0.0003	18	27	33.51	-0.008
710	BD+18°684 . . .	7.1	4	40	24.367	+0.0073	18	38	35.67	-0.078
718	302 B. Tauri	6.1	4	43	49.457	+0.0047	+18	39	37.70	-0.066
726	305 B. Tauri	6.8	4	46	14.407	+0.0138	18	38	28.40	-0.379
729	BD+16°657 . . .	7.2	4	47	57.942	+0.0064	17	07	54.78	-0.037
730	<i>i</i> Tauri	5.1	4	48	54.856	+0.0060	18	46	12.01	-0.037
736	312 B. Tauri	6.2	4	52	30.036	+0.0046	19	25	08.44	-0.032
760	333 B. Tauri <i>m</i>	6.5	5	03	03.370	-0.0007	+19	45	01.77	-0.023
764	<i>m</i> Tauri <i>m</i>	5.0	5	04	57.899	+0.0377	18	35	25.58	+0.023
765	<i>l</i> Tauri	5.3	5	05	19.057	-0.0040	20	21	53.15	-0.033
769	107 Tauri	6.6	5	06	21.553	+0.0006	19	48	25.09	-0.019
787	BD+18°812 <i>m</i> . . .	7.5	5	14	16.336	-0.0018	+18	23	38.97	-0.013

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Cat. No.	Name of Star	Magni- tude	Right Ascension	Annual Proper Motion	Declination	Annual Proper Motion
			h m s	s	° ' "	"
790	BD+19°886	6.9	5 15 01.888	-0.0008	+20 05 18.34	-0.111
793	351 B. Tauri	6.2	5 16 45.448	-0.0027	20 05 32.17	-0.031
796	352 B. Tauri	6.8	5 17 49.481	-0.0003	19 32 12.64	-0.015
798	353 B. Tauri	6.4	5 18 27.561	-0.0009	19 46 23.57	-0.032
800	BD+18°831	7.5	5 19 11.837	-0.0005	18 52 00.54	-0.013
808	BD+20°948	6.8	5 22 40.417	-0.0006	+20 32 49.71	-0.001
814	115 Tauri	5.3	5 24 42.933	+0.0001	17 55 39.65	-0.032
823	BD+18°862	6.6	5 26 51.592	-0.0012	18 19 59.59	-0.014
826	BD+20°969	6.8	5 27 45.103	-0.0006	20 31 13.24	-0.006
829	BD+18°873	7.0	5 29 11.671	-0.0009	18 12 52.16	-0.054
832	119 Tauri	4.7	5 29 44.884	-0.0001	+18 33 53.57	+0.002
836	120 Tauri	5.5	5 31 03.800	-0.0003	18 30 43.44	+0.001
837	372 B. Tauri	6.1	5 31 08.860	-0.0009	20 26 46.53	-0.004
862	BD+18°920	7.5	5 40 00.386	+0.0006	18 58 07.83	-0.019
863	127 Tauri	6.7	5 40 25.311	-0.0005	18 57 42.50	-0.011
871	BD+18°950	6.9	5 42 43.418	-0.0005	+18 41 16.93	-0.007
878	130 Tauri	5.5	5 44 59.125	-0.0008	17 42 54.16	-0.011
886	BD+18°987	7.0	5 48 36.616	-0.0019	18 32 27.42	-0.009
888	BD+19°1110	6.0	5 49 54.042	-0.0001	19 51 31.72	-0.006
892	203 B. Orionis	6.6	5 50 49.109	-0.0007	20 17 27.89	-0.014
894	χ^1 Orionis	4.6	5 51 53.619	-0.0134	+20 16 13.05	-0.081
895	57 Orionis	5.9	5 52 27.412	0.0000	19 44 35.65	-0.006
896	BD+17°1051	7.4	5 52 31.714	-0.0003	17 23 44.38	-0.013
904	BD+18°1040	7.1	5 56 26.433	-0.0012	18 49 04.02	-0.033
913	64 Orionis	5.2	6 00 58.111	+0.0004	19 41 35.03	-0.018
915	χ^2 Orionis	4.7	6 01 25.456	+0.0001	+20 08 28.10	-0.008
934	BD+18°1112	6.4	6 08 34.253	-0.0004	18 08 25.51	-0.013
938	BD+17°1154 <i>pr.</i> . .	7.2	6 09 12.346	+0.0004	17 23 17.18	-0.036
940	68 Orionis	5.7	6 09 32.001	-0.0001	19 48 06.14	-0.010
943	19 B. Geminorum	6.2	6 11 05.107	-0.0001	18 41 35.24	-0.020
944	124 H ¹ . Orionis	5.7	6 12 01.361	-0.0001	+17 55 11.89	-0.012
947	71 Orionis	5.2	6 12 22.538	-0.0069	19 10 20.76	-0.187
951	BD+18°1141	6.8	6 13 13.671	-0.0025	18 18 44.27	-0.022
961	287 B. Orionis	6.2	6 16 35.225	-0.0012	17 20 35.45	-0.025
970	292 B. Orionis	6.5	6 18 58.837	+0.0016	17 47 04.66	-0.052
971	BD+19°1313	7.3	6 19 06.267	-0.0005	+19 54 46.37	-0.005
975	BD+17°1224 <i>m.</i> . . .	6.8	6 20 22.814	+0.0004	17 35 46.24	-0.035
981	BD+17°1235	6.8	6 22 39.512	-0.0003	17 01 08.10	-0.011
985	BD+18°1214	6.9	6 23 42.487	-0.0081	18 47 02.50	-0.189
1003	21 Geminorum <i>fol.</i> . .	7.2	6 29 51.441	+0.0026	17 48 56.36	+0.026
1006	22 Geminorum	6.9	6 32 10.534	-0.0003	+19 27 47.11	-0.015
1011	BD+17°1306	7.4	6 33 27.009	-0.0009	17 43 40.38	-0.019
1012	23 Geminorum	6.7	6 33 36.161	+0.0009	16 49 57.50	-0.034
1025	BD+19°1430	7.4	6 37 33.188	-0.0008	19 41 52.53	-0.088
1029	26 Geminorum	5.1	6 39 57.542	0.0000	17 41 17.24	-0.086
1038	BD+18°1338	6.8	6 43 53.129	+0.0005	+18 53 00.85	-0.011
1039	BD+16°1273	6.7	6 44 23.506	-0.0004	16 49 08.30	-0.003
1040	74 B. Geminorum <i>m.</i> . .	6.2	6 44 56.173	-0.0002	18 14 26.04	-0.048
1057	98 B. Geminorum	6.9	6 53 49.999	-0.0007	17 47 35.85	-0.039
1060	BD+19°1559	7.4	6 56 03.753	-0.0007	+19 16 48.18	-0.004

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Cat. No.	Name of Star	Magnitude	Right Ascension	Annual Proper Motion	Declination	Annual Proper Motion
			h m s	s	° ' "	"
1072	110 B. Geminorum . . .	6.2	6 59 58.944	+0.0010	+17 49 01.02	+0.030
1073	41 H ¹ . Geminorum . . .	6.0	7 00 07.903	-0.0014	16 44 10.85	-0.015
1091	BD+17°1518 . . .	6.7	7 09 21.295	+0.0004	17 02 51.10	-0.044
1096	51 Geminorum . . .	5.3	7 10 57.572	+0.0006	16 13 54.60	-0.046
1104	BD+16°1433 . . .	6.8	7 14 20.007	-0.0007	16 13 20.72	+0.028
1106	λ Geminorum . . .	3.6	7 15 40.779	-0.0034	+16 37 03.91	-0.040
1115	BD+15°1554 . . .	6.7	7 20 37.793	-0.0003	15 26 25.73	-0.009
1114	143 B. Geminorum . . .	6.8	7 20 38.099	-0.0041	18 21 20.35	-0.046
1116	BD+17°1561 . . .	7.4	7 20 39.988	-0.0011	17 29 29.58	-0.013
1124	BD+18°1610 . . .	6.9	7 23 27.785	-0.0001	18 13 55.63	-0.013
1141	162 B. Geminorum . . .	5.6	7 29 23.116	+0.0025	+17 10 36.65	-0.088
1145	67 Geminorum . . .	6.7	7 31 01.025	-0.0009	15 43 50.35	-0.012
1147	68 Geminorum . . .	5.1	7 31 12.680	-0.0016	15 55 07.10	-0.010
1158	f Geminorum . . .	5.2	7 37 03.141	+0.0004	17 46 18.21	-0.004
1176	BD+16°1551 . . .	7.4	7 43 45.253	-0.0011	16 32 30.84	-0.021
1183	BD+15°1676 . . .	7.2	7 48 09.338	-0.0053	+14 56 56.82	-0.033
1190	BD+16°1580 . . .	7.1	7 51 34.278	-0.0010	16 08 48.34	-0.028
1197	1 Cancri . . .	6.0	7 54 36.417	-0.0023	15 54 14.34	-0.042
1198	2 B. Cancri . . .	6.2	7 56 07.790	-0.0004	16 37 59.17	-0.017
1210	5 Cancri . . .	5.9	7 59 06.697	-0.0003	16 34 21.08	-0.009
1212	BD+15°1734 . . .	7.1	8 00 20.525	+0.0007	+15 04 03.07	-0.008
1231	12 Cancri . . .	6.3	8 06 21.650	-0.0004	13 45 52.69	-0.014
1234	30 B. Cancri . . .	6.1	8 08 37.388	-0.0016	14 45 18.99	-0.006
1235	BD+16°1657 . . .	7.4	8 09 13.771	-0.0007	16 20 36.96	+0.005
1237	BD+14°1850 . . .	6.4	8 10 01.223	-0.0021	14 07 52.03	-0.012
1246	23 H ¹ . Cancri . . .	6.6	8 15 52.208	-0.0020	+15 48 34.03	0.019
1247	BD+16°1687 . . .	6.8	8 16 46.107	-0.0016	16 15 15.62	-0.029
1256	BD+14°1879 . . .	7.1	8 19 33.041	-0.0033	13 45 32.72	-0.012
1257	BD+15°1805 . . .	7.5	8 19 35.985	-0.0013	14 54 10.27	-0.025
1265	27 Cancri . . .	5.8	8 24 24.628	-0.0016	12 47 40.23	-0.109
1271	29 Cancri . . .	5.9	8 26 16.784	-0.0013	+14 21 04.73	-0.010
1281	84 B. Cancri . . .	6.4	8 31 25.507	-0.0025	13 24 08.17	-0.050
1309	A ¹ Cancri . . .	5.7	8 40 53.574	-0.0002	12 49 57.95	-0.002
1318	A ² Cancri . . .	5.7	8 44 37.948	-0.0047	12 15 55.10	-0.054
1320	BD+13°1994 . . .	6.8	8 46 21.038	-0.0021	12 42 11.03	-0.003
1328	BD+14°1989 . . .	7.0	8 51 26.535	-0.0023	+13 59 25.97	+0.001
1332	60 Cancri . . .	5.7	8 53 38.021	-0.0013	11 47 16.08	-0.009
1341	α Cancri . . .	4.3	8 56 11.485	+0.0021	12 01 17.67	-0.031
1344	177 B. Cancri . . .	6.8	8 57 08.452	-0.0009	13 14 18.81	-0.015
1359	κ Cancri . . .	5.1	9 05 28.395	-0.0019	10 50 18.30	-0.007
1364	209 B. Cancri . . .	6.5	9 07 29.515	-0.0035	+11 44 11.21	-0.073
1381	222 B. Cancri . . .	6.3	9 15 34.737	-0.0004	11 40 41.12	-0.007
1384	BD+10°1972 . . .	7.4	9 17 15.104	-0.0010	9 58 05.25	0.000
1397	ω Leonis m. . . .	5.5	9 26 12.523	+0.0028	9 14 26.49	-0.007
1409	ξ Leonis . . .	5.1	9 29 40.991	-0.0067	11 29 12.49	-0.084
1410	h Leonis . . .	5.3	9 29 42.575	-0.0007	+ 9 54 07.13	-0.014
1428	o Leonis . . .	3.8	9 38 54.615	-0.0099	10 05 03.43	-0.041
1429	BD+9°2226 . . .	6.8	9 39 00.373	-0.0018	9 11 15.42	-0.043
1433	BD+11°2087 . . .	6.8	9 41 20.083	+0.0024	10 42 48.44	-0.112
1440	BD+9°2239 . . .	6.7	9 45 02.870	-0.0057	+ 8 45 56.48	-0.054

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Cat. No.	Name of Star	Magni- tude	Right Ascension			Annual Proper Motion	Declination			Annual Proper Motion
			h	m	s		°	'	"	
1454	79 B. Leonis	7.1	9	51	53.276	-0.0014	+8	16	24.50	-0.029
1457	BD+8°2289	6.7	9	53	41.910	-0.0004	7	52	37.73	-0.044
1458	83 B. Leonis	5.9	9	54	12.409	-0.0065	9	07	58.55	+0.013
1465	89 B. Leonis	6.3	9	55	54.164	+0.0005	8	30	54.89	-0.030
1468	π Leonis	4.9	9	57	59.696	-0.0023	8	14	47.42	-0.026
1478	BD+8°2316	7.2	10	02	51.347	+0.0014	+8	11	42.99	+0.010
1482	14 Sextantis	6.3	10	04	35.679	-0.0025	5	49	01.27	-0.019
1489	16 Sextantis	6.8	10	07	02.854	-0.0012	6	22	38.90	-0.008
1518	43 Leonis	6.3	10	20	48.610	-0.0014	6	45	23.37	-0.103
1519	155 B. Leonis	6.5	10	21	03.783	-0.0156	5	54	28.89	-0.067
1528	84 B. Sextantis	6.6	10	23	58.438	-0.0001	+4	08	47.01	-0.013
1539	173 B. Leonis	7.4	10	28	15.637	-0.0037	7	16	30.28	+0.003
1546	32 Sextantis	7.2	10	30	07.629	-0.0006	4	51	41.00	+0.028
1564	34 Sextantis <i>m.</i>	6.6	10	40	27.367	-0.0059	3	48	10.67	+0.019
1565	35 Sextantis <i>fol.</i>	6.3	10	41	10.118	+0.0013	4	58	07.38	-0.028
1566	36 Sextantis	6.6	10	42	59.581	-0.0038	+2	42	33.80	-0.024
1577	227 B. Leonis	7.1	10	48	46.747	-0.0008	3	48	48.90	-0.003
1599	<i>d</i> Leonis	5.0	10	58	23.497	+0.0009	3	50	36.39	-0.015
1611	<i>p</i> ⁴ Leonis	5.7	11	04	45.659	-0.0256	2	11	02.00	-0.087
1623	<i>p</i> ⁵ Leonis	5.4	11	11	36.525	-0.0029	0	09	33.73	+0.002
1624	BD+3°2475	6.8	11	11	43.631	-0.0065	+2	29	52.63	-0.040
1635	75 Leonis	5.4	11	15	07.670	+0.0032	2	14	30.27	-0.147
1637	76 Leonis	6.0	11	16	45.550	-0.0035	1	52	51.40	-0.058
1649	359 B. Leonis	6.3	11	21	08.848	-0.0029	0	21	45.71	-0.019
1652	79 Leonis	5.5	11	21	52.964	-0.0012	+1	38	19.16	+0.004
1662	388 B. Leonis	6.3	11	25	44.848	-0.0028	-1	28	06.65	+0.005
1685	<i>v</i> Leonis	4.5	11	34	47.841	+0.0002	0	35	30.09	+0.042
1688	431 B. Leonis	6.3	11	36	15.234	-0.0025	-2	12	12.58	+0.004
1692	438 B. Leonis	6.8	11	38	14.819	-0.0001	+1	11	06.58	-0.004
1705	BD-2°3411	7.5	11	44	31.700	+0.0014	-3	30	30.73	-0.038
1708	9 B. Virginis	6.2	11	46	52.724	-0.0136	-0	05	06.48	+0.003
1717	16 B. Virginis	7.3	11	51	43.037	-0.0024	3	32	33.42	-0.047
1726	24 B. Virginis	6.9	11	54	51.654	-0.0102	4	32	56.35	+0.009
1727	18 G. Virginis	7.1	11	55	58.096	-0.0085	4	08	14.63	+0.068
1735	31 B. Virginis	6.4	11	58	52.604	-0.0018	1	32	00.27	-0.073
1744	46 B. Virginis	6.5	12	03	50.663	-0.0020	-2	53	51.36	-0.022
1753	BD-1°2632	7.1	12	09	12.724	+0.0014	2	27	52.68	-0.071
1754	65 B. Virginis	6.9	12	09	12.724	-0.0073	3	32	40.52	-0.066
1759	78 B. Virginis	6.5	12	12	06.209	-0.0057	5	29	04.02	+0.113
1768	98 B. Virginis	7.0	12	15	59.768	-0.0011	3	43	16.62	+0.015
1769	42 G. Virginis	6.6	12	16	00.183	-0.0002	-3	42	56.59	+0.024
1779	129 B. Virginis	6.7	12	21	05.614	+0.0014	4	44	29.18	-0.034
1787	162 B. Virginis	6.0	12	25	42.090	-0.0063	4	22	59.07	-0.001
1792	BD-5°3513	7.1	12	27	52.306	-0.0074	5	47	25.78	-0.060
1795	193 B. Virginis	7.1	12	28	40.821	-0.0040	3	49	44.15	+0.010
1798	200 B. Virginis	6.3	12	29	28.973	-0.0026	-4	49	15.86	+0.031
1807	<i>f</i> Virginis	5.9	12	34	37.403	-0.0016	5	36	02.14	-0.020
1814	71 G. Virginis	7.0	12	36	33.620	-0.0030	4	08	34.82	-0.017
1817	261 B. Virginis	6.9	12	37	20.655	+0.0025	5	52	11.61	-0.005
1822	28 Virginis	7.2	12	39	47.168	+0.0009	-7	16	10.83	-0.051

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Cat. No.	Name of Star	Magni- tude	Right Ascension			Annual Proper Motion	Declination			Annual Proper Motion
			h	m	s		°	'	"	
1836	319 B. Virginis	6.3	12	45	22.986	-0.0001	- 6	04	20.12	-0.046
1843	339 B. Virginis	6.9	12	47	55.070	-0.0167	7	24	14.01	+0.006
1859	99 G. Virginis	6.8	12	55	07.672	+0.0007	8	41	02.72	-0.014
1865	BD-5°3605	7.2	12	56	49.598	-0.0014	5	51	51.05	-0.003
1868	BD-8°3466	7.1	12	58	18.164	-0.0025	8	52	26.52	-0.051
1886	<i>g</i> Virginis	5.7	13	06	20.839	-0.0025	- 8	45	35.88	-0.073
1887	BD-8°3495	6.4	13	07	02.514	-0.0026	9	18	53.28	-0.028
1888	50 Virginis	6.2	13	07	33.135	-0.0010	10	06	20.78	-0.014
1890	BD-6°3750	7.4	13	07	35.012	-0.0036	7	25	55.00	-0.031
1900	56 Virginis	7.2	13	12	32.756	-0.0021	10	08	52.96	-0.053
1901	474 B. Virginis	6.9	13	12	43.670	-0.0134	-11	08	38.74	-0.326
1908	58 Virginis	7.2	13	15	15.009	-0.0056	10	19	32.11	+0.008
1911	487 B. Virginis	7.1	13	15	32.113	+0.0014	8	30	42.12	-0.049
1914	62 Virginis	6.8	13	18	07.388	-0.0082	11	05	02.32	-0.011
1917	BD-9°3669	7.0	13	19	00.035	-0.0087	9	46	48.17	+0.034
1925	α Virginis	1.2	13	22	58.601	-0.0027	-10	56	33.66	-0.034
1945	<i>h</i> Virginis	5.4	13	30	45.083	-0.0024	9	56	57.52	-0.045
1946	BD-7°3639	7.2	13	30	59.608	-0.0158	8	13	43.44	+0.042
1948	BD-7°3643 <i>m</i>	7.4	13	32	05.454	-0.0058	8	24	13.07	-0.026
1971	86 Virginis	5.8	13	43	41.764	-0.0012	12	13	00.62	0.000
1973	575 B. Virginis	6.2	13	44	59.949	-0.0004	- 9	29	59.31	-0.051
1996	<i>n</i> Virginis	6.9	13	53	34.350	-0.0016	9	21	16.53	-0.005
1997	601 B. Virginis	6.8	13	53	39.341	+0.0005	9	33	00.92	+0.013
2000	608 B. Virginis	7.1	13	56	11.467	+0.0094	11	51	12.95	-0.149
2002	607 B. Virginis	6.8	13	56	13.754	+0.0007	13	55	05.62	-0.006
2013	BD-10°3810	7.5	14	01	12.451	+0.0001	-10	45	57.13	+0.002
2021	672 B. Virginis	6.7	14	04	25.121	-0.0003	14	00	18.34	-0.023
2025	633 B. Virginis	6.8	14	06	13.697	-0.0012	11	37	50.80	-0.016
2034	BD-13°3845	7.2	14	10	53.208	-0.0028	13	39	49.50	-0.035
2036	BD-11°3693	6.9	14	11	27.389	+0.0010	11	38	33.02	-0.026
2053	λ Virginis	4.6	14	16	49.941	-0.0013	-13	10	43.47	+0.025
2060	2 Libræ	6.3	14	21	09.756	-0.0006	11	31	23.28	-0.059
2064	4 G. Libræ <i>m</i>	6.5	14	22	25.124	-0.0051	11	28	48.23	-0.035
2065	6 G. Libræ	6.6	14	23	00.792	-0.0041	13	09	51.12	-0.007
2069	BD-14°3959	7.3	14	25	03.872	-0.0122	14	39	00.95	-0.064
2070	7 G. Libræ	6.7	14	25	28.325	-0.0052	-13	10	17.76	-0.035
2074	BD-14°3968	7.1	14	27	55.679	-0.0041	15	03	47.31	+0.057
2088	6 B. Libræ	6.2	14	34	45.448	-0.0595	12	07	40.54	+0.358
2092	BD-13°3944	7.2	14	38	13.992	+0.0003	13	52	02.39	-0.018
2097	11 B. Libræ	7.1	14	39	45.254	0.0000	12	03	22.94	-0.004
2105	5 Libræ	6.6	14	43	38.494	-0.0027	-15	17	01.61	-0.013
2114	μ Libræ <i>fol</i>	5.8	14	47	00.648	-0.0041	13	58	31.22	-0.031
2117	8 Libræ	5.3	14	48	21.514	-0.0069	15	49	25.83	-0.075
2118	α Libræ	2.9	14	48	33.011	-0.0072	15	52	06.33	-0.073
2132	BD-16°3970	7.1	14	53	58.964	-0.0011	16	37	53.80	-0.034
2136	47 B. Libræ	6.8	14	55	44.057	-0.0031	-17	11	48.21	-0.001
2147	64 B. Libræ	7.0	15	00	44.512	+0.0024	17	28	06.69	-0.043
2159	ν Libræ	5.3	15	04	16.712	-0.0027	16	05	42.69	-0.026
2160	22 Libræ	6.6	15	04	28.107	-0.0041	16	19	22.82	-0.021
2170	88 B. Libræ	6.8	15	09	28.835	-0.0012	-16	00	06.38	-0.022

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2173	BD-17°4273 . . .	7.0	15	10	03.374	+0.0037.	-17	55	58.10	+0.008
2180	BD-13°4111 . . .	7.0	15	11	59.097	0.0000	14	03	12.90	-0.017
2181	97 B. Libræ . . .	7.1	15	12	05.312	-0.0082	18	16	22.38	-0.028
2182	26 Libræ . . .	6.3	15	12	11.210	-0.0016	17	36	46.90	-0.022
2192	28 Libræ . . .	6.2	15	18	30.454	-0.0009	18	00	26.18	-0.059
2193	o Libræ . . .	6.1	15	18	40.196	+0.0018	-15	23	53.50	+0.021
2196	30 Libræ . . .	6.7	15	20	40.931	-0.0002	14	59	07.39	+0.017
2208	BD-14°4208 . . .	7.4	15	25	20.966	-0.0010	14	48	32.55	-0.011
2209	32 Libræ . . .	5.9	15	25	52.988	+0.0012	16	34	16.91	-0.034
2210	BD-15°4118 . . .	6.8	15	26	17.006	-0.0037	15	33	25.04	+0.021
2211	33 Libræ . . .	7.2	15	27	11.890	-0.0046	-17	17	49.66	+0.014
2213	34 Libræ . . .	5.9	15	28	17.966	+0.0020	16	28	00.26	-0.007
2218	ξ Libræ . . .	5.6	15	30	32.549	-0.0010	16	42	41.97	-0.011
2232	174 B. Libræ . . .	7.2	15	36	17.869	-0.0022	17	31	42.50	-0.038
2246	BD-16°4151 . . .	7.4	15	41	33.925	-0.0005	16	44	14.99	+0.012
2247	η Libræ . . .	5.6	15	41	42.358	-0.0024	-15	32	25.47	-0.067
2259	194 B. Libræ . . .	6.7	15	47	27.868	+0.0019	17	46	30.31	-0.014
2264	BD-18°4182 . . .	7.4	15	49	12.745	-0.0009	18	48	49.83	-0.051
2271	θ Libræ . . .	4.3	15	51	25.758	+0.0068	16	36	27.21	+0.127
2275	47 Libræ <i>m.</i> . . .	5.9	15	52	34.419	-0.0011	19	15	37.77	-0.022
2280	204 B. Libræ . . .	6.8	15	54	42.231	+0.0008	-15	54	49.02	-0.043
2291	49 Libræ . . .	5.5	15	57	57.882	-0.0442	16	24	40.30	-0.401
2296	49 B. Scorpii . . .	7.1	16	00	40.336	-0.0009	19	43	31.85	-0.014
2301	BD-18°4228 . . .	6.8	16	02	37.453	-0.0038	18	25	32.27	-0.033
2302	β Scorpii . . .	2.9	16	02	59.443	0.0000	19	41	31.36	-0.025
2303	56 B. Scorpii . . .	5.1	16	02	59.786	-0.0010	-19	41	18.55	-0.022
2313	BD-17°4494 . . .	7.0	16	05	41.653	+0.0019	18	07	51.14	-0.133
2316	73 B. Scorpii . . .	6.4	16	07	29.846	-0.0051	18	13	51.09	-0.087
2322	ν Scorpii <i>m.</i> . . .	4.3	16	09	33.002	-0.0005	19	21	11.27	-0.030
2331	88 B. Scorpii . . .	6.4	16	12	13.539	-0.0067	18	25	45.74	-0.125
2338	93 B. Scorpii . . .	6.6	16	14	31.598	-0.0007	-20	00	04.85	-0.013
2341	BD-17°4534 . . .	7.2	16	16	02.036	+0.0009	17	17	09.82	-0.060
2345	BD-18°4260 . . .	6.9	16	17	08.709	-0.0007	18	43	39.96	-0.004
2352	107 B. Scorpii . . .	6.7	16	20	28.735	+0.0013	16	55	18.93	-0.019
2353	ψ Ophiuchi . . .	4.6	16	21	38.472	-0.0014	19	56	26.62	-0.052
2361	χ Ophiuchi . . .	4.8	16	24	35.101	-0.0008	-18	21	45.44	-0.027
2390	120 B. Scorpii . . .	6.7	16	36	02.246	-0.0012	18	08	15.50	-0.022
2391	121 B. Scorpii . . .	7.1	16	36	07.654	-0.0019	18	44	35.03	-0.017
2394	123 B. Scorpii . . .	6.5	16	38	05.687	+0.0008	20	19	42.66	+0.017
2396	BD-17°4616 . . .	6.6	16	38	52.248	+0.0029	17	58	45.66	-0.045
2399	24 Scorpii . . .	5.0	16	39	08.415	-0.0013	-17	39	45.23	-0.004
2401	131 B. Scorpii . . .	5.6	16	39	25.297	+0.0018	19	50	43.87	+0.042
2408	BD-18°4320 . . .	6.9	16	43	02.598	+0.0003	19	03	40.05	-0.005
2425	68 B. Ophiuchi . . .	5.9	16	50	56.181	-0.0036	20	20	49.39	-0.037
2436	81 B. Ophiuchi <i>fol.</i> . . .	6.3	16	54	35.707	-0.0002	19	28	30.26	-0.018
2441	90 B. Ophiuchi . . .	6.5	16	57	17.373	-0.0018	-18	11	05.91	-0.158
2446	BD-20°4606 . . .	7.2	16	58	45.516	-0.0005	20	22	33.97	-0.012
2448	29 Ophiuchi . . .	6.4	16	59	23.613	-0.0024	18	49	32.14	-0.026
2454	108 B. Ophiuchi . . .	7.2	17	02	03.034	+0.0018	17	26	01.20	-0.120
2456	109 B. Ophiuchi . . .	6.2	17	02	15.824	-0.0003	-20	26	14.74	-0.031

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2460	125 B. Ophiuchi	6.1	17	05	48.355	+0.0008	-17	33	18.32	-0.039
2463	132 B. Ophiuchi	6.9	17	07	46.515	+0.0013	19	23	04.14	+0.015
2465	BD-20°4661	7.4	17	08	52.430	-0.0001	20	22	26.99	-0.028
2485	BD-17°4759	7.4	17	14	17.268	+0.0001	17	52	09.59	-0.045
2495	164 B. Ophiuchi <i>m.</i>	6.0	17	17	26.471	-0.0003	17	42	51.73	-0.031
2497	166 B. Ophiuchi	6.6	17	18	06.125	-0.0105	-19	17	26.58	-0.128
2508	192 B. Ophiuchi	6.3	17	22	09.335	+0.0010	18	24	31.38	-0.025
2527	226 B. Ophiuchi	6.9	17	30	32.265	+0.0004	17	28	02.52	+0.015
2531	BD-18°4586	7.3	17	34	33.556	-0.0067	18	58	00.40	-0.069
2548	BD-17°4903	7.5	17	41	41.814	+0.0011	17	43	36.03	-0.050
2555	BD-18°4645 <i>m.</i>	7.5	17	44	59.576	+0.0012	-18	05	35.38	-0.016
2556	BD-20°4874	7.1	17	45	00.890	0.0000	20	49	24.08	-0.022
2571	6 G. Sagittarii	6.9	17	49	19.396	+0.0002	19	30	53.64	-0.090
2573	290 B. Ophiuchi	7.3	17	49	50.751	-0.0003	19	06	44.46	-0.025
2578	305 B. Ophiuchi	6.4	17	53	26.614	+0.0007	18	47	48.09	-0.033
2591	16 G. Sagittarii	6.5	17	57	30.078	+0.0005	-20	20	16.91	-0.020
2596	BD-19°4800	7.3	17	59	23.642	+0.0003	19	06	24.67	+0.006
2606	BD-17°5001	7.1	18	00	54.861	+0.0012	17	36	44.19	-0.008
2611	BD-19°4832	6.8	18	03	03.977	+0.0001	19	45	31.06	-0.005
2629	39 G. Sagittarii <i>m.</i>	6.3	18	08	45.341	-0.0002	19	51	07.89	-0.043
2632	BD-20°5027	7.2	18	09	27.026	+0.0008	-20	26	03.88	-0.011
2639	16 Sagittarii	6.0	18	12	42.921	-0.0001	20	24	08.07	-0.001
2640	64 B. Sagittarii	6.1	18	13	02.667	+0.0010	18	40	34.56	-0.008
2642	17 Sagittarii	7.1	18	14	05.183	+0.0011	20	33	36.11	-0.014
2646	6 B. Scuti	6.0	18	14	44.926	+0.0001	17	23	24.28	-0.017
2647	52 G. Sagittarii	6.4	18	15	00.654	-0.0001	-18	28	48.34	-0.007
2649	BD-18°4888	6.6	18	15	22.841	0.0000	18	48	56.10	-0.002
2653	17 H ¹ . Sagittarii <i>m.</i>	6.4	18	16	15.228	+0.0009	18	38	14.54	+0.005
2658	Y Sagittarii (<i>var.</i>)	5.4-6.2	18	18	54.705	+0.0005	18	52	50.04	-0.017
2674	85 B. Sagittarii	6.0	18	25	29.367	-0.0003	17	49	39.35	-0.005
2680	95 B. Sagittarii	5.8	18	27	43.634	+0.0020	-18	45	26.60	-0.104
2685	BD-18°4986	7.0	18	28	51.135	-0.0094	18	56	14.05	-0.192
2686	100 B. Sagittarii	5.2	18	28	58.561	-0.0006	18	25	59.60	-0.023
2687	BD-19°5047 (<i>var.</i>)	6.5-7.3	18	29	24.829	-0.0003	19	09	22.97	-0.013
2690	BD-18°4994	7.0	18	30	42.450	+0.0007	18	24	02.76	-0.011
2695	BD-17°5245	7.0	18	32	41.719	+0.0008	-17	01	11.92	+0.003
2699	110 B. Sagittarii	7.2	18	32	54.973	+0.0024	19	18	10.54	-0.002
2705	116 B. Sagittarii	6.8	18	35	25.182	+0.0007	17	16	06.83	-0.002
2715	89 G. Sagittarii	6.5	18	40	26.650	+0.0003	19	19	34.39	-0.037
2718	92 G. Sagittarii	6.7	18	41	40.299	+0.0005	19	21	41.58	+0.019
2722	BD-17°5310	7.1	18	43	10.412	-0.0005	-17	35	23.83	-0.029
2724	130 B. Sagittarii	6.6	18	43	32.319	0.0000	19	39	06.87	-0.003
2731	BD-18°5079	6.5	18	46	17.690	+0.0003	18	38	57.74	-0.002
2733	BD-19°5182	6.4	18	47	07.086	-0.0006	19	11	28.32	+0.010
2737	BD-17°5347	6.8	18	48	53.740	+0.0006	17	12	18.62	-0.013
2744	BD-16°5060	6.8	18	50	35.127	+0.0003	-16	26	01.94	-0.014
2745	BD-18°5115	6.9	18	50	38.855	+0.0006	18	41	20.42	-0.024
2753	BD-16°5083	7.1	18	53	19.318	+0.0025	16	24	14.23	-0.046
2755	BD-18°5134	6.6	18	53	46.678	-0.0001	18	45	53.40	-0.013
2758	BD-19°5242	7.0	18	55	07.547	+0.0002	-19	12	36.47	0.000

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2763	BD-19°5255 . . .	6.7	18	56	55.597	+0.0006	-19	20	15.18	-0.011
2764	BD-18°5155 . . .	6.3	18	56	59.317	+0.0002	18	37	29.96	-0.018
2786	BD-16°5153 . . .	6.0	19	04	27.234	+0.0006	16	17	42.96	-0.012
2787	187 B. Sagittarii . . .	6.4	19	04	40.870	+0.0006	18	48	15.73	-0.017
2789	BD-17°5478 . . .	7.3	19	04	52.612	-0.0001	17	18	30.54	-0.018
2794	BD-19°5317 . . .	6.7	19	06	16.501	+0.0017	-19	01	14.75	+0.004
2808	BD-17°5535 . . .	7.4	19	12	24.849	+0.0023	17	25	14.32	-0.015
2812	BD-16°5220 . . .	7.5	19	13	01.526	+0.0003	16	10	24.13	-0.031
2815	BD-16°5253 . . .	7.1	19	15	15.447	+0.0018	16	02	36.30	-0.002
2816	BD-19°5387 . . .	6.8	19	15	43.564	-0.0003	18	56	26.59	-0.013
2820	BD-16°5272 . . .	7.2	19	16	45.267	+0.0013	-15	59	10.76	-0.001
2826	<i>p</i> Sagittarii . . .	4.0	19	19	14.218	-0.0019	17	55	40.49	+0.021
2827	<i>v</i> Sagittarii . . .	4.6	19	19	19.305	-0.0001	16	02	07.77	-0.005
2828	45 Sagittarii . . .	6.0	19	19	23.910	+0.0071	18	23	17.12	-0.101
2830	BD-17°5611 . . .	6.9	19	21	23.434	+0.0008	17	16	40.70	-0.032
2833	BD-18°5356 . . .	7.0	19	22	40.308	+0.0006	-18	38	48.09	-0.013
2846	246 B. Sagittarii . . .	6.9	19	25	38.669	0.0000	18	26	44.30	+0.003
2847	BD-15°5362 . . .	6.7	19	26	12.036	+0.0001	15	11	21.22	0.000
2856	BD-16°5360 (<i>var.</i>)	6.6-7.6	19	31	54.572	0.0000	16	28	00.30	-0.003
2871	BD-17°5699 <i>fol.</i> . .	7.1	19	36	48.153	+0.0028	17	00	19.27	+0.007
2874	BD-15°5420 . . .	6.8	19	37	29.196	+0.0008	-15	15	52.92	-0.017
2876	54 Sagittarii . . .	5.4	19	38	19.046	+0.0047	16	23	27.49	-0.040
2880	<i>e</i> Sagittarii . . .	5.1	19	40	07.003	+0.0042	16	13	26.26	-0.009
2883	283 B. Sagittarii . . .	5.5	19	41	09.852	+0.0109	15	34	07.93	-0.176
2889	BD-17°5746 . . .	7.1	19	44	44.320	+0.0026	17	10	56.70	-0.006
2900	BD-15°5484 . . .	6.8	19	49	19.448	+0.0004	-14	53	06.75	+0.016
2905	BD-14°5578 . . .	6.4	19	50	44.246	0.0000	14	42	43.42	-0.034
2913	<i>g</i> Sagittarii . . .	5.0	19	55	34.136	+0.0008	15	36	15.71	-0.095
2922	BD-17°5832 . . .	7.4	19	59	08.408	+0.0108	16	59	06.99	-0.069
2927	337 B. Sagittarii . . .	7.2	20	01	10.760	+0.0013	15	31	55.95	+0.004
2936	1 B. Capricorni . . .	6.8	20	06	07.091	+0.0023	-15	09	13.30	-0.128
2951	BD-13°5619 . . .	7.1	20	12	46.546	-0.0010	13	30	45.21	-0.023
2968	16 B. Capricorni . . .	6.2	20	18	24.986	+0.0022	14	55	07.71	-0.004
2969	β Capricorni . . .	3.2	20	18	39.158	+0.0028	14	54	55.54	+0.004
2972	21 B. Capricorni . . .	6.7	20	21	05.334	-0.0002	14	23	33.19	-0.005
2975	BD-14°5734 . . .	7.0	20	21	53.242	-0.0022	-14	15	01.35	-0.014
2992	BD-13°5680 . . .	7.5	20	27	10.806	+0.0007	12	43	57.14	-0.018
2995	27 G. Capricorni . . .	6.2	20	28	43.164	-0.0032	15	11	53.09	-0.057
3001	BD-12°5766 . . .	7.0	20	31	42.884	+0.0016	12	29	17.76	-0.007
3002	45 B. Capricorni . . .	6.2	20	31	51.471	+0.0045	13	52	00.00	+0.077
3006	BD-12°5778 . . .	7.0	20	33	57.499	+0.0015	-12	31	40.24	+0.019
3008	13 Capricorni . . .	6.9	20	34	59.954	+0.0041	15	17	38.60	-0.036
3025	BD-12°5818 . . .	6.8	20	41	16.701	+0.0005	11	47	36.64	-0.003
3027	BD-14°5839 . . .	7.0	20	42	13.222	+0.0015	14	20	18.75	-0.009
3045	84 B. Capricorni . . .	6.0	20	48	22.949	+0.0088	12	42	06.73	-0.078
3051	87 B. Capricorni . . .	7.0	20	50	12.040	+0.0022	-13	21	42.82	+0.013
3054	16 B. Aquarii . . .	6.4	20	50	47.820	+0.0030	11	44	01.33	+0.042
3065	BD-12°5876 . . .	7.5	20	55	44.187	-0.0011	12	07	04.30	-0.005
3070	8 Aquarii . . .	6.6	20	57	36.397	-0.0021	13	12	57.88	+0.004
3072	9 Aquarii . . .	6.6	20	58	49.542	+0.0004	-13	41	43.53	+0.006

MEAN PLACES FOR 1958.0 (January 0.861, Universal Time)

Cat. No.	Name of Star		Magni- tude	Right Ascension			Annual Proper Motion	Declination			Annual Proper Motion	
				h	m	s		°	'	"		
3075	35 B.	Aquarii	7.1	20	59	42.481	-0.0007	-11	51	43.25	-0.036	
3077		BD-10°5578	6.8	21	00	18.999	-0.0012	10	09	44.06	+0.016	
3093	ν	Aquarii	4.5	21	07	18.434	+0.0062	11	32	34.66	-0.016	
3104	51 G.	Aquarii	6.5	21	12	00.483	+0.0017	10	46	48.07	-0.003	
3110	14	Aquarii	6.8	21	14	02.514	-0.0008	9	23	26.22	+0.011	
3111		BD-10°5636	6.8	21	14	42.365	-0.0013	-10	18	40.27	-0.019	
3125	64 G.	Aquarii	6.9	21	19	43.440	+0.0004	9	30	26.17	-0.049	
3128	17	Aquarii	6.2	21	20	41.239	-0.0015	9	29	57.58	-0.020	
3133	19	Aquarii	5.8	21	22	57.684	+0.0013	9	55	42.35	-0.167	
3145	96 G.	Capricorni	6.8	21	25	21.988	+0.0017	11	50	58.75	-0.071	
3154		BD-10°5696	7.4	21	29	19.624	-0.0080	-	9	55	45.12	-0.125
3163		BD-10°5714	7.3	21	34	39.811	+0.0026	10	21	48.36	+0.006	
3166	ξ	Aquarii	4.8	21	35	30.992	+0.0075	8	02	36.78	-0.024	
3169	137 B.	Capricorni	6.2	21	37	12.756	+0.0017	10	46	01.51	-0.058	
3184	117 G.	Capricorni	7.1	21	42	40.934	+0.0030	9	13	48.74	+0.028	
3185	c ¹	Capricorni	5.3	21	42	45.926	+0.0005	-	9	16	34.63	-0.001
3187	c ²	Capricorni	6.2	21	44	01.872	+0.0010	9	28	13.97	+0.013	
3199		BD-9°5854	6.8	21	48	21.243	+0.0041	9	10	44.29	-0.029	
3212		BD-7°5669	7.5	21	54	01.001	+0.0014	7	10	47.68	+0.010	
3216		BD-9°5876	6.6	21	55	25.744	+0.0003	8	45	54.24	+0.013	
3229	30	Aquarii	5.6	22	01	03.919	+0.0028	-	6	43	34.56	+0.005
3233		BD-9°5908	7.2	22	02	18.018	+0.0001	8	55	14.73	-0.051	
3235	122 B.	Aquarii	7.5	22	03	53.097	+0.0098	5	33	44.64	-0.066	
3247	36	Aquarii	7.0	22	07	13.682	+0.0043	8	23	34.62	+0.054	
3248	128 B.	Aquarii	6.6	22	07	16.911	+0.0056	7	45	00.52	-0.450	
3259		BD-7°5727	7.4	22	10	30.789	+0.0154	-	6	40	38.73	+0.015
3269	θ	Aquarii	4.3	22	14	37.089	+0.0079	7	59	35.28	-0.019	
3272	44	Aquarii	5.8	22	14	54.972	-0.0001	5	35	51.10	+0.028	
3281	162 B.	Aquarii	7.5	22	19	11.983	+0.0019	6	27	18.28	-0.005	
3285	170 B.	Aquarii	6.1	22	21	19.984	-0.0005	7	24	27.18	+0.009	
3287	51	Aquarii <i>m</i>	5.8	22	21	55.611	+0.0016	-	5	03	00.49	-0.005
3290		BD-5°5790	7.3	22	23	55.448	+0.0012	5	23	30.71	-0.001	
3308	186 B.	Aquarii	6.2	22	29	06.151	+0.0105	6	46	11.86	-0.102	
3311		BD-7°5805	7.0	22	30	21.597	+0.0193	6	41	03.25	+0.028	
3320	κ	Aquarii	5.3	22	35	34.864	-0.0049	4	26	42.69	-0.112	
3326	207 B.	Aquarii	6.4	22	38	37.539	-0.0004	-	3	46	23.91	-0.039
3328	209 B.	Aquarii	7.0	22	39	54.911	+0.0047	5	19	16.84	-0.032	
3340		BD-3°5505	7.5	22	45	02.383	+0.0071	2	55	51.89	-0.038	
3344	231 B.	Aquarii <i>m</i>	6.8	22	45	40.166	-0.0136	4	26	50.85	-0.308	
3366	255 B.	Aquarii	6.6	22	54	56.700	+0.0024	3	28	12.92	+0.015	
3370	6 G.	Piscium	6.2	22	56	05.667	-0.0013	-	2	37	12.62	-0.001
3371		BD-2°5858	6.4	22	56	13.854	+0.0062	1	38	07.16	-0.003	
3397		BD-1°4393	7.4	23	05	36.406	-0.0008	0	31	24.31	+0.011	
3411		BD-3°5592 <i>m</i>	7.2	23	11	56.666	-0.0023	2	51	49.02	-0.011	
3420		BD-2°5914	7.1	23	13	48.761	+0.0015	-	1	39	10.89	+0.008
3444	22 B.	Piscium	6.5	23	21	22.592	+0.0042	+	0	03	38.00	+0.023
3453	κ	Piscium	4.9	23	24	46.684	+0.0055	1	01	31.46	-0.096	
3455	9	Piscium	6.4	23	25	05.623	+0.0030	+	0	53	29.83	-0.033
3459	11	Piscium	6.6	23	27	17.576	-0.0012	-	2	01	21.09	-0.017
3460	12	Piscium	7.1	23	27	21.019	-0.0013	-	1	16	01.96	-0.032

MEAN PLACES FOR 1958.0 (January 0.861, Universal Time)

Cat. No.	Name of Star	Magni- tude	Right Ascension			Annual Proper Motion	Declination			Annual Proper Motion
			h	m	s		°	'	"	
3462	BD+0°5009	7.5	23	28	31.432	-0.0015	+0	38	44.61	-0.006
3467	13 Piscium	6.5	23	29	48.191	+0.0003	-1	19	04.53	+0.025
3474	14 Piscium	6.0	23	31	59.373	+0.0070	-1	28	46.51	-0.005
3477	15 Piscium	6.6	23	33	19.648	-0.0036	+1	04	51.91	-0.017
3482	BD+1°4744	5.6	23	34	14.597	-0.0072	1	52	08.18	+0.060
3494	λ Piscium	4.6	23	39	54.114	-0.0090	+1	32	55.98	-0.146
3500	BD-1°4485	7.3	23	42	50.803	+0.0001	-0	53	37.50	+0.003
3502	BD-0°4566	7.4	23	44	25.534	-0.0017	+0	17	48.96	-0.030
3507	BD+1°4773	6.4	23	46	40.240	+0.0001	1	58	52.61	-0.032
3508	21 Piscium	5.8	23	47	18.334	-0.0006	0	50	34.40	-0.025
3512	22 Piscium	5.8	23	49	48.717	+0.0010	+2	41	48.31	-0.015
3515	25 Piscium	6.2	23	50	55.569	+0.0005	+1	51	25.62	-0.005

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JANUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	'
391	7.4	2	36	42.70	+14	40	49.5	1	1	13.6	+5	17.7	+0.4013	0.5455	+0.1247	+61	-6
403	5.8	2	42	15.36	15	08	08.1		3	52.4	+7	51.3	+0.2346	0.5471	0.1214	+50	-15
413	6.8	2	45	41.51	15	20	02.7		5	30.3	+9	26.1	+0.2166	0.5480	0.1193	+49	-16
422	5.5	2	49	11.78	14	54	37.7		7	09.8	+11	02.4	+0.8691	0.5490	0.1172	+90	+22
423	6.4	2	50	52.71	16	18	49.1		7	57.5	+11	48.5	-0.5506	0.5495	0.1161	+5	-62
434	6.9	2	55	09.55	+16	07	35.2		9	58.4	-10	14.6	-0.1174	0.5507	+0.1135	+29	-33
450	6.6	3	02	21.84	15	41	40.6		13	20.7	-6	58.9	+0.7214	0.5528	0.1089	+90	+14
466	7.3	3	10	05.21	16	21	35.7		16	55.9	-3	30.8	+0.3875	0.5550	0.1038	+61	-5
505	7.0	3	27	21.85	16	37	07.5	2	0	51.6	+4	08.9	+0.8841	0.5599	0.0920	+90	+26
510	7.2	3	28	59.46	17	47	45.3		1	36.0	+4	51.8	-0.3056	0.5603	0.0908	+19	-42
517	6.4	3	31	46.37	+17	41	46.9		2	51.7	+6	04.9	-0.0859	0.5612	+0.0888	+31	-29
532	7.2	3	40	15.68	17	09	35.6		6	41.6	+9	46.9	+0.8138	0.5634	0.0827	+90	+22
577	6.0	3	50	47.57	17	12	10.8		11	24.3	-9	40.2	+1.1368	0.5662	0.0749	+90	+48
593	5.8	3	58	25.28	18	04	35.5		14	47.4	-6	24.1	+0.4522	0.5682	0.0691	+66	+3
614	5.7	4	06	44.92	19	29	56.9		18	27.6	-2	51.7	-0.8121	0.5704	0.0627	-11	-71
617	6.6	4	08	18.28	+18	18	51.9		19	08.6	-2	12.1	+0.4835	0.5708	+0.0615	+69	+5
629	7.5	4	15	37.76	18	09	16.4		22	20.7	+0	53.3	+0.8388	0.5725	0.0557	+90	+27
639	6.0	4	18	00.46	18	38	34.0		23	22.9	+1	53.2	+0.3800	0.5731	0.0538	+60	0
654	6.0	4	22	32.06	18	56	46.1	3	1	20.8	+3	47.0	+0.1621	0.5741	0.0502	+46	-11
668	3.6	4	26	11.68	19	05	16.9		2	55.9	+5	18.7	+0.0897	0.5750	0.0472	+41	-15
718	6.1	4	43	51.55	+18	39	33.4		10	31.3	-11	22.4	+0.8421	0.5788	+0.0328	+90	+29
730	5.1	4	48	56.97	18	46	07.5		12	41.4	-9	17.0	+0.7929	0.5798	0.0286	+90	+26
736	6.2	4	52	32.17	19	25	03.8		14	12.9	-7	48.9	+0.1545	0.5805	0.0255	+45	-9
760	6.5	5	03	05.53	19	44	56.6		18	40.9	-3	30.7	-0.0976	0.5825	0.0166	+30	-22
765	5.3	5	05	21.23	20	21	47.9		19	38.1	-2	35.6	-0.7233	0.5828	0.0147	-6	-70
793	6.2	5	16	47.64	+20	05	26.3	4	0	26.3	+2	02.0	-0.3905	0.5848	+0.0049	+14	-39
798	6.4	5	18	29.75	19	46	17.6		1	09.1	+2	43.1	-0.0555	0.5850	+0.0035	+33	-19
837	6.1	5	31	11.08	20	26	39.9		6	26.6	+7	48.8	-0.7634	0.5869	-0.0074	-9	-70
888	6.0	5	49	56.27	19	51	24.1		14	12.7	-8	42.5	-0.2736	0.5891	0.0236	+20	-33
894	4.6	5	51	55.86	20	16	05.3		15	02.1	-7	55.0	-0.7183	0.5892	0.0253	-6	-69
895	5.9	5	52	29.64	+19	44	27.9		15	16.0	-7	41.6	-0.1802	0.5893	-0.0258	+26	-28
913	5.2	6	01	00.35	19	41	26.8		18	46.4	-4	19.1	-0.2315	0.5901	0.0332	+23	-32
915	4.7	6	01	27.70	20	08	19.9		18	57.7	-4	08.3	-0.6993	0.5902	0.0336	-4	-68
940	5.7	6	09	34.25	19	47	57.5		22	17.7	-0	55.9	-0.4724	0.5907	0.0406	+9	-48
943	6.2	6	11	07.34	18	41	26.4		22	55.9	-0	19.1	+0.6413	0.5908	0.0419	+85	+16
1197	6.0	7	54	38.54	+15	54	01.6	6	17	20.9	-7	30.7	-0.1178	0.5895	-0.1248	+29	-34
1198	6.2	7	56	09.91	16	37	46.4		17	58.5	-6	54.4	-0.9331	0.5894	0.1259	-19	-74
1210	5.9	7	59	08.81	16	34	08.2		19	12.4	-5	43.4	-1.0278	0.5892	0.1280	-26	-74
1234	6.1	8	08	39.47	14	45	06.0		23	08.3	-1	56.3	+0.2908	0.5883	0.1345	+54	-12
1237	6.4	8	10	03.30	14	07	39.1		23	43.0	-1	22.9	+0.8422	0.5882	0.1355	+90	+19
1271	5.9	8	26	18.82	+14	20	51.5	7	6	28.2	+5	07.2	-0.3311	0.5865	-0.1460	+18	-49
1281	6.4	8	31	27.52	13	23	54.9		8	36.9	+7	11.1	+0.3077	0.5859	-0.1492	+55	-13
1309	5.7	8	40	55.56	12	49	44.6		12	34.3	+10	59.7	+0.2786	0.5848	0.1549	+53	-15
1318	5.7	8	44	39.92	12	15	41.8		14	08.3	-11	29.8	+0.6046	0.5844	0.1571	+79	+3
1332	5.7	8	53	39.97	11	47	02.8		17	55.2	-7	51.3	+0.4806	0.5833	0.1621	+67	-5
1341	4.3	8	56	13.43	+12	01	04.3		18	59.8	-6	49.1	+0.0704	0.5830	-0.1635	+40	-27
1359	5.1	9	05	30.31	10	50	05.0		22	54.8	-3	02.7	+0.6084	0.5818	0.1683	+79	+2
1364	6.5	9	07	31.42	11	43	57.8		23	46.1	-2	13.3	-0.4373	0.5815	0.1693	+12	-58
1381	6.3	9	15	36.62	11	40	27.7	8	3	11.8	+1	04.8	-0.9658	0.5805	0.1733	-20	-79
1397	5.5	9	26	14.37	9	14	13.4		7	43.2	+5	26.4	+0.6846	0.5791	0.1781	+88	+5
1410	5.3	9	29	44.41	+9	53	54.0		9	12.8	+6	52.8	-0.2459	0.5787	-0.1796	+22	-47
1428	3.8	9	38	56.41	10	04	50.2		13	09.1	+10	40.4	-1.1431	0.5775	0.1833	-34	-80
1465	6.3	9	55	55.90	8	30	42.1		20	27.7	-6	16.7	-0.9329	0.5754	0.1894	-17	-82
1468	4.9	9	58	01.42	8	14	34.7		21	21.9	-5	24.4	-0.8350	0.5751	0.1900	-11	-82
1482	6.3	10	04	37.39	+5	48	49.2	9	0	13.2	-2	39.3	+1.0546	0.5743	-0.1920	+90	+28

Full Moon—Jan. 5^d 20^h 09^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JANUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels			
		h	m	s	°	'	"	d	h	m	h	m				°	'		
1518	6.3	10	20	50.25	+	6	45	11.2	9	7	16.0	+	4	08.4	-1.2555	0.5724	-0.1962	-46	-84
1519	6.5	10	21	05.42		5	54	16.9		7	22.6	+	4	14.8	-0.4266	0.5724	0.1963	+13	-61
1565	6.3	10	41	11.68		4	57	56.0		16	10.1	-11	16.4	-1.2288	0.5704	0.2000	-42	-86	
1611	5.7	11	04	47.13		2	10	51.9	10	2	33.1	-	1	15.3	-0.5268	0.5684	0.2024	+7	-70
1623	5.4	11	11	37.98		0	09	24.4		5	34.6	+	1	39.9	+0.8934	0.5679	0.2027	+90	+15
1649	6.3	11	21	10.25	+	0	21	36.5		9	47.8	+	5	44.3	-0.1664	0.5672	-0.2027	+27	-46
1662	6.3	11	25	46.25	-	1	28	15.1		11	50.1	+	7	42.3	+1.2613	0.5670	0.2026	+89	+46
1685	4.5	11	34	49.19		0	35	38.6		15	51.0	+11	34.8	-0.4328	0.5666	0.2022	+12	-63	
1688	6.3	11	36	16.59		2	12	20.5		16	29.8	-11	47.8	+1.0581	0.5665	0.2021	+88	+26	
1744	6.5	12	03	51.89		2	53	58.2	11	4	45.4	+	0	02.3	-0.7022	0.5658	0.1986	-3	-89
1759	6.5	12	12	07.42	-	5	29	09.7		8	25.8	+	3	35.1	+1.1812	0.5657	-0.1970	+85	+37
1787	6.0	12	25	43.22		4	23	04.7		14	28.6	+	9	25.3	-1.1132	0.5658	0.1938	-32	-90
1798	6.3	12	29	30.09		4	49	21.2		16	09.5	+11	02.6	-0.9957	0.5659	0.1928	-23	-90	
1807	5.9	12	34	38.50		5	36	07.0		18	26.5	-10	45.1	-0.6465	0.5660	0.1913	-1	-82	
1836	6.3	12	45	24.04		6	04	24.5		23	13.2	-6	08.4	-1.0764	0.5663	0.1880	-29	-90	
1886	5.7	13	06	21.81	-	8	45	38.5	12	8	30.6	+	2	49.5	-0.0638	0.5671	-0.1803	+30	-40
1887	6.4	13	07	03.49		9	18	55.7		8	49.0	+	3	07.3	+0.4443	0.5672	0.1800	+61	-12
1888	6.2	13	07	34.11		10	06	22.9		9	02.6	+	3	20.4	+1.2071	0.5672	0.1798	+80	+41
1925	1.2	13	22	59.51		10	56	34.9		15	51.3	+	9	54.8	+0.8573	0.5680	0.1731	+80	+13
1945	5.4	13	30	45.94		9	56	58.8		19	16.8	-10	46.9	-0.7411	0.5685	0.1695	-9	-90	
1971	5.8	13	43	42.57	-12	13	00.7		13	0	58.2	-5	17.5	+0.6243	0.5694	-0.1630	+72	-1	
2053	4.6	14	16	50.59		13	10	42.0		15	27.0	+8	40.6	-0.6209	0.5719	0.1442	-4	-81	
2117	5.3	14	48	22.02		15	49	22.5	14	5	06.7	-2	09.0	+0.2616	0.5745	0.1238	+42	-21	
2118	2.9	14	48	33.51		15	52	03.0		5	11.7	-2	04.3	+0.2973	0.5745	0.1236	+45	-19	
2159	5.3	15	04	17.14		16	05	38.8		11	58.2	+	4	27.6	-0.2696	0.5757	0.1126	+12	-52
2182	6.3	15	12	11.61	-17	36	42.3		15	22.0		7	44.2	+0.9250	0.5762	-0.1068	+73	+19	
2192	6.2	15	18	30.82		18	00	21.3		18	04.7	+10	21.0	+1.0499	0.5766	0.1021	+72	+29	
2209	5.9	15	25	53.31		16	34	12.3		21	14.3	-10	36.3	-0.7494	0.5771	0.0966	-17	-90	
2213	5.9	15	28	18.27		16	27	55.6		22	16.3	-9	36.5	-0.9569	0.5772	0.0948	-31	-90	
2218	5.6	15	30	32.84		16	42	37.2		23	13.9	-8	41.0	-0.7938	0.5774	0.0930	-20	-90	
2275	5.9	15	52	34.62	-19	15	31.8		15	8	38.5	+	0	23.1	+1.0553	0.5784	-0.0759	+71	+30
2302	2.9	16	02	59.60		19	41	25.0		13	04.9	+	4	39.8	+1.1873	0.5788	0.0675	+71	+44
2303	5.1	16	02	59.94		19	41	12.2		13	05.1	+	4	40.0	+1.1835	0.5788	0.0675	+71	+43
2316	6.4	16	07	29.97		18	13	45.1		15	00.1	+	6	30.9	-0.4595	0.5789	0.0638	-4	-66
2322	4.3	16	09	33.13		19	21	04.9		15	52.6	+	7	21.4	+0.6542	0.5789	0.0622	+65	+1
2331	6.4	16	12	13.65	-18	25	39.6		17	01.0		8	27.3	-0.3777	0.5790	-0.0600	0	-60	
2353	4.6	16	21	38.54		19	56	19.9		21	01.6	-11	40.9	+0.9736	0.5791	0.0522	+71	+23	
2361	4.8	16	24	35.15		18	21	39.1		22	16.8	-10	28.4	-0.7373	0.5791	0.0498	-21	-90	
2394	6.5	16	38	05.68		20	19	35.7	16	4	02.1	-4	55.6	+1.0629	0.5791	0.0385	+70	+31	
2401	5.6	16	39	25.29		19	50	37.0		4	36.0	-4	22.9	+0.5364	0.5791	0.0374	+53	-5	
2425	5.9	16	50	56.13	-20	20	42.3		9	30.6		0	20.9	+0.9027	0.5789	-0.0277	+70	+18	
2436	6.3	16	54	35.63		19	28	23.3		11	04.3	+	1	51.2	-0.0520	0.5788	0.0247	+15	-39
2448	6.4	16	59	23.52		18	49	25.3		13	07.2	+	3	49.7	-0.7799	0.5786	0.0206	-26	-90
2456	6.2	17	02	15.72		20	26	07.5		14	20.8	+	5	00.6	+0.8879	0.5785	-0.0182	+70	+17
2578	6.4	17	53	26.32		18	47	41.1	17	12	21.6	+	2	13.8	-0.7645	0.5747	+0.0250	-25	-90
2591	6.5	17	57	29.77	-20	20	09.6		14	07.3		3	55.7	+0.9136	0.5743	+0.0283	+70	+19	
2629	6.3	18	08	45.00		19	51	00.7		19	01.4	+	8	39.4	+0.5616	0.5730	0.0376	+55	-4
2639	6.0	18	12	42.57		20	24	00.9		20	45.2	+10	19.5	+1.2134	0.5725	0.0408	+70	+48	
2640	6.1	18	13	02.32		18	40	27.6		20	53.8	+10	27.9	-0.6122	0.5724	0.0411	-14	-82	
2647	6.4	18	15	00.30		18	28	41.4		21	45.5	+11	17.7	-0.7845	0.5721	0.0427	-24	-90	
2653	6.4	18	16	14.87	-18	38	07.6		22	18.2		+11	49.2	-0.5942	0.5720	+0.0437	-13	-79	
2658	5.4-6.2	18	18	54.34		18	52	43.1		23	28.1	-11	03.3	-0.2840	0.5716	0.0459	+4	-54	
3163	7.3	21	34	39.43		10	21	44.8	21	19	41.6	+	6	09.6	+1.1103	0.5307	0.1656	+80	+31
3184	7.1	21	42	40.58		9	13	45.2		23	47.4	+10	08.0	+0.5527	0.5291	0.1682	+69	-6	
3185	5.3	21	42	45.57	-	9	16	31.1		23	49.9	+10	10.5	+0.6104	0.5291	+0.1682	+74	-2	

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JANUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			T	H		Y	x'	y'	Limiting Parallels						
		h	m	s	°	'	''		d	h				m	°	'				
3187	6.2	21	44	01.52	-	9	28	10.5	22	0	28.8	+10	48.2	+0.9329	0.5288	+0.1687	+81	+18		
3199	6.8	21	48	20.90		9	10	40.9		2	42.0	-11	02.5	+0.9895	0.5279	0.1700	+81	+22		
3212	7.5	21	54	00.68		7	10	44.2		5	37.1	-	8	12.6	-0.7071	0.5269	0.1716	-	5	-90
3216	6.6	21	55	25.42		8	45	51.0		6	20.9	-	7	30.1	+1.1598	0.5266	0.1720	+82	+36	
3229	5.6	22	01	03.62		6	43	31.2		9	16.1	-	4	40.1	-0.5765	0.5256	0.1735	+	3	-75
3248	6.6	22	07	16.63	-	7	44	57.5		12	30.0	-	1	31.9	+1.1133	0.5245	+0.1750	+83	+31	
3259	7.4	22	10	30.52		6	40	35.6		14	11.1	+	0	06.2	+0.2285	0.5239	0.1758	+48	-23	
3272	5.8	22	14	54.72		5	35	47.9		16	29.1	+	2	20.3	-0.5550	0.5232	0.1768	+	4	-73
3281	7.5	22	19	11.74		6	27	15.3		18	43.8	+	4	31.0	+0.7875	0.5225	0.1776	+84	+	8
3287	5.8	22	21	55.39		5	02	57.4		20	09.7	+	5	54.4	-0.5061	0.5220	0.1782	+	7	-69
3290	7.3	22	23	55.23	-	5	23	27.7		21	12.7	+	6	55.6	+0.0578	0.5218	+0.1785	+38	-33	
3320	5.3	22	35	34.69		4	26	39.8	23	3	21.7	-11	06.1	+0.1175	0.5201	0.1804	+42	-29		
3326	6.4	22	38	37.38		3	46	21.0		4	58.4	-	9	32.1	-0.3331	0.5197	0.1808	+17	-56	
3340	7.5	22	45	02.25		2	55	49.0		8	22.6	-	6	13.8	-0.6469	0.5189	0.1816	0	-82	
3344	6.8	22	45	40.03		4	26	48.3		8	42.7	-	5	54.3	+1.0893	0.5188	0.1817	+86	+29	
3366	6.6	22	54	56.60	-	3	28	10.4		13	39.0	-	1	06.4	+0.9093	0.5178	+0.1825	+87	+16	
3370	6.2	22	56	05.58		2	37	09.9		14	15.8	-	0	30.7	+0.0812	0.5177	0.1826	+40	-31	
3371	6.4	22	56	13.77		1	38	04.3		14	20.1	-	0	26.4	-0.9946	0.5176	0.1826	-22	-90	
3420	7.1	23	13	48.75	-	1	39	08.5		23	44.5	+	8	41.9	+0.7470	0.5162	0.1834	+89	+	5
3444	6.5	23	21	22.62	+	0	03	40.6	24	3	48.1	-11	21.5	-0.4062	0.5157	0.1834	+14	-61		
3453	4.9	23	24	46.74	+	1	01	34.2		5	37.7	-	9	34.9	-1.1401	0.5156	+0.1834	-33	-89	
3455	6.4	23	25	05.68		0	53	32.5		5	47.9	-	9	25.0	-0.9608	0.5155	0.1833	-19	-90	
3462	7.5	23	28	31.50		0	38	47.2		7	38.5	-	7	37.6	-0.3505	0.5154	0.1833	+17	-57	
3477	6.6	23	33	19.74		1	04	54.4		10	13.4	-	5	07.0	-0.3599	0.5152	0.1830	+16	-58	
3482	5.6	23	34	14.70		1	52	10.9		10	43.0	-	4	38.3	-1.1430	0.5152	0.1830	-33	-89	
3494	4.6	23	39	54.24	+	1	32	58.4		13	45.6	-	1	40.8	-0.2317	0.5150	+0.1827	+23	-49	
3507	6.4	23	46	40.40		1	58	55.0		17	24.1	+	1	51.6	-0.0467	0.5150	0.1821	+33	-38	
3508	5.8	23	47	18.49		0	50	36.4		17	44.6	+	2	11.5	+1.2777	0.5149	0.1821	+90	+49	
3512	5.8	23	49	48.90		2	41	50.8		19	05.5	+	3	30.1	-0.5325	0.5149	0.1818	+	7	-70
3515	6.2	23	50	55.75		1	51	27.8		19	41.5	+	4	05.0	+0.5075	0.5149	0.1817	+69	-	8
6	6.9	0	03	13.28	+	3	22	23.0	25	2	18.0	+10	30.3	+0.0234	0.5151	+0.1802	+37	-34		
30	7.0	0	13	48.10		4	01	06.2		7	58.7	-	7	58.6	+0.3265	0.5155	0.1785	+55	-17	
64	6.6	0	27	59.31		4	37	42.1		15	34.2	-	0	36.0	+0.9952	0.5163	0.1757	+90	+23	
68	5.7	0	30	14.01		6	43	27.9		16	46.1	+	0	33.8	-1.1172	0.5165	0.1752	-31	-84	
98	6.2	0	45	13.59		6	30	44.9	26	0	44.8	+	8	18.8	+0.5013	0.5179	0.1715	+68	-	7
103	6.1	0	46	06.94	+	7	04	17.4		1	13.1	+	8	46.3	-0.0368	0.5180	+0.1713	+34	-36	
105	4.6	0	46	30.52		7	21	26.7		1	25.6	+	8	58.5	-0.3177	0.5180	0.1711	+18	-53	
143	6.8	1	00	18.86		8	35	48.5		8	43.3	-	7	56.5	-0.4546	0.5197	0.1671	+11	-62	
145	6.7	1	00	31.49		8	54	29.5		8	50.0	-	7	50.0	-0.7805	0.5198	0.1670	-	8	-82
146	4.4	1	00	46.20		7	39	53.7		8	57.7	-	7	42.5	+0.6160	0.5198	0.1670	+79	0	
162	6.9	1	04	26.90	+	8	08	11.8		10	53.7	-	5	49.8	+0.4160	0.5203	+0.1658	+62	-11	
166	6.9	1	06	10.48		9	41	05.9		11	48.1	-	4	57.0	-1.1455	0.5206	0.1652	-35	-81	
186	7.1	1	13	35.39		9	33	48.0		15	41.1	-	1	10.8	-0.3740	0.5216	0.1626	+15	-56	
201	7.5	1	20	31.71		10	09	06.5		19	18.1	+	2	19.9	-0.4396	0.5228	0.1601	+12	-60	
209	7.2	1	23	45.99		10	11	21.9		20	59.1	+	3	57.9	-0.2126	0.5233	0.1589	+24	-45	
240	5.6	1	34	52.90	+11	55	40.4		27	2	43.8	+	9	32.5	-1.2275	0.5254	+0.1545	-44	-79	
241	6.9	1	35	27.31		11	51	55.3		3	01.5	+	9	49.7	-1.1129	0.5254	0.1542	-32	-79	
264	7.0	1	44	56.02		10	38	07.3		7	53.2	-	9	27.4	+0.9812	0.5273	0.1502	+90	+25	
272	5.9	1	48	38.88		10	50	11.0		9	46.9	-	7	37.1	+1.0427	0.5281	0.1485	+90	+30	
279	7.1	1	51	15.82		12	28	36.8		11	06.8	-	6	19.6	-0.5637	0.5286	0.1474	+	5	-67
284	7.4	1	52	10.96	+11	11	49.0			11	34.8	-	5	52.4	+0.9116	0.5288	+0.1470	+90	+21	
290	6.1	1	57	11.63		12	05	32.0		14	07.3	-	3	24.5	+0.2981	0.5299	0.1446	+54	-14	
299	6.3	2	00	20.13		13	16	31.2		15	42.5	-	1	52.2	-0.7720	0.5306	0.1431	-	8	-77
325	7.4	2	10	26.94		13	43	21.3		20	47.4	+	3	03.5	-0.5465	0.5329	0.1381	+	5	-64
340	7.1	2	16	36.22	+12	47	56.5			23	51.7	+	6	02.1	+0.8836	0.5343	+0.1349	+90	+20	

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JANUARY-FEBRUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels		
		h	m	s	°	'	"	d	h	m	h	m				°	'
374	6.1	2	30	37.02	+14	50	59.7	28	6	47.4	-11	15.1	-0.4489	0.5377	+0.1274	+11	-56
380	7.4	2	33	44.69	13	34	21.7		8	19.5	-9	45.9	+1.1381	0.5385	0.1256	+90	+42
391	7.4	2	36	42.36	14	40	48.0		9	46.4	-8	21.7	+0.1113	0.5393	0.1239	+42	-22
403	5.8	2	42	15.02	15	08	06.7		12	28.5	-5	44.7	-0.0541	0.5407	0.1207	+33	-31
413	6.8	2	45	41.18	15	20	01.3		14	08.5	-4	07.9	-0.0706	0.5415	0.1187	+32	-32
422	5.5	2	49	11.45	+14	54	36.3		15	50.2	-2	29.4	+0.5891	0.5425	+0.1165	+78	+5
423	6.4	2	50	52.38	16	18	47.8		16	38.9	-1	42.3	-0.8415	0.5429	0.1155	-13	-74
434	6.9	2	55	09.23	16	07	33.9		18	42.4	+0	17.3	-0.4024	0.5440	0.1129	+13	-51
445	7.3	2	58	35.21	14	51	58.5		20	21.1	+1	52.9	+1.1483	0.5449	0.1108	+90	+45
450	6.6	3	02	21.52	15	41	39.4		22	09.2	+3	37.5	+0.4474	0.5459	0.1084	+65	-2
466	7.3	3	10	04.89	+16	21	34.5	29	1	49.3	+7	10.5	+0.1152	0.5480	+0.1035	+43	-19
505	7.0	3	27	21.55	16	37	06.4		9	55.9	-8	58.9	+0.6267	0.5527	0.0919	+83	+10
510	7.2	3	28	59.16	17	47	44.4		10	41.3	-8	15.0	-0.5719	0.5530	0.0908	+3	-61
517	6.4	3	31	46.07	17	41	45.9		11	58.8	-7	00.1	-0.3485	0.5538	0.0888	+16	-45
532	7.2	3	40	15.40	17	09	34.7		15	54.0	-3	12.7	+0.5644	0.5561	0.0829	+76	+7
577	6.0	3	50	47.30	+17	12	09.9		20	43.2	+1	26.7	+0.8973	0.5588	+0.0752	+90	+28
593	5.8	3	58	25.02	18	04	34.7	30	0	10.9	+4	47.4	+0.2126	0.5608	0.0696	+49	-10
600	6.8	4	02	16.79	17	24	10.7		1	55.6	+6	28.5	+1.0500	0.5618	0.0667	+90	+41
614	5.7	4	06	44.67	19	29	56.4		3	56.1	+8	24.9	-1.0555	0.5630	0.0633	-30	-71
617	6.6	4	08	18.04	18	18	51.2		4	38.0	+9	05.3	+0.2514	0.5633	0.0622	+51	-8
629	7.5	4	15	37.53	+18	09	15.7		7	54.4	-11	45.1	+0.6151	0.5652	+0.0565	+82	+13
639	6.0	4	18	00.23	18	38	33.4		8	57.9	-10	43.7	+0.1546	0.5658	0.0547	+45	-12
643	6.7	4	19	07.68	18	19	06.3		9	27.9	-10	14.8	+0.5261	0.5661	0.0538	+72	+8
654	6.0	4	22	31.84	18	56	45.5		10	58.4	-8	47.4	-0.0614	0.5669	0.0511	+32	-24
658	4.2	4	23	05.17	17	49	57.1		11	13.2	-8	33.2	+1.1330	0.5670	0.0507	+90	+50
663	6.9	4	24	40.60	+18	06	47.7		11	55.4	-7	52.4	+0.8699	0.5674	+0.0495	+90	+29
668	3.6	4	26	11.46	19	05	16.4		12	35.6	-7	13.7	-0.1314	0.5678	0.0483	+28	-27
691	6.6	4	33	16.47	19	47	44.7		15	42.7	-4	13.1	-0.7386	0.5695	0.0427	-7	-71
697	7.2-7.4	4	34	50.00	18	27	29.1		16	23.7	-3	33.5	+0.7057	0.5699	0.0414	+90	+20
710	7.1	4	40	26.26	18	38	31.0		18	50.9	-1	11.6	+0.6063	0.5712	0.0369	+81	+14
718	6.1	4	43	51.37	+18	39	32.9		20	20.3	+0	14.7	+0.6406	0.5720	+0.0342	+85	+17
726	6.8	4	46	16.33	18	38	23.4		21	23.4	+1	15.5	+0.6953	0.5725	0.0322	+90	+20
730	5.1	4	48	56.79	18	46	07.0		22	33.0	+2	22.7	+0.5952	0.5731	0.0300	+80	+14
736	6.2	4	52	31.99	19	25	03.4	31	0	06.3	+3	52.6	-0.0443	0.5739	0.0271	+33	-20
760	6.5	5	03	05.38	19	44	56.3		4	39.3	+8	15.8	-0.2888	0.5762	0.0184	+19	-34
764	5.0	5	04	59.90	+18	35	19.6		5	28.4	+9	03.1	+0.9430	0.5765	+0.0168	+90	+37
765	5.3	5	05	21.08	20	21	47.7		5	37.5	+9	11.9	-0.9160	0.5766	0.0165	-19	-70
769	6.6	5	06	23.58	19	48	19.4		6	04.3	+9	37.7	-0.3236	0.5768	0.0156	+17	-36
790	6.9	5	15	03.95	20	05	12.3		9	46.6	-10	48.1	-0.5727	0.5786	0.0084	+3	-54
793	6.2	5	16	47.51	20	05	26.0		10	30.7	-10	05.6	-0.5708	0.5789	0.0069	+3	-53
796	6.8	5	17	51.54	+19	32	06.3		10	57.9	-9	39.3	+0.0129	0.5791	+0.0060	+37	-15
798	6.4	5	18	29.63	19	46	17.3		11	14.1	-9	23.7	-0.2326	0.5792	0.0055	+23	-29
800	7.5	5	19	13.89	18	51	54.0		11	32.9	-9	05.6	+0.7163	0.5794	0.0049	+90	+24
808	6.8	5	22	42.51	20	32	43.4		13	01.5	-7	40.3	-1.0336	0.5800	+0.0019	-29	-70
826	6.8	5	27	47.22	20	31	06.7		15	10.5	-5	36.0	-1.0046	0.5810	-0.0024	-26	-70
832	4.7	5	29	46.97	+18	33	46.4		16	01.1	-4	47.3	+1.0307	0.5813	-0.0041	+90	+45
836	5.5	5	31	05.89	18	30	36.1		16	34.4	-4	15.2	+1.0828	0.5815	0.0052	+90	+49
837	6.1	5	31	10.98	20	26	39.7		16	36.5	-4	13.1	-0.9319	0.5815	0.0052	-20	-70
862	7.5	5	40	02.52	18	58	00.2		20	20.2	-0	37.6	+0.5720	0.5830	0.0128	+77	+15
863	6.7	5	40	27.44	18	57	34.8		20	30.7	-0	27.6	+0.5770	0.5831	0.0131	+78	+15
871	6.9	5	42	45.55	+18	41	09.1		21	28.6	+0	28.2	+0.8472	0.5835	-0.0151	+90	+31
886	7.0	5	48	38.77	18	32	19.2		23	56.5	+2	50.6	+0.9550	0.5844	0.0202	+90	+38
888	6.0	5	49	56.22	19	51	23.8	1	0	28.9	+3	21.8	-0.4219	0.5846	0.0212	+12	-43
892	6.6	5	50	51.30	20	17	20.0		0	51.9	+3	43.9	-0.8778	0.5847	0.0220	-16	-70
894	4.6	5	51	55.81	+20	16	05.1		1	18.8	+4	09.9	-0.8661	0.5849	-0.0229	-16	-70

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

FEBRUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m			°	°
895	5.9	5	52	29.60	+19	44	27.6	1	1	32.9	+ 4	23.5	-0.3257	0.5850	+17	-37
904	7.1	5	56	28.62	18	48	55.5	3	12	6	+ 5	59.4	+0.5903	0.5855	+79	+15
913	5.2	6	01	00.32	19	41	26.5	5	05	6	+ 7	48.2	-0.3687	0.5861	+15	-40
915	4.7	6	01	27.67	20	08	19.7	5	17	0	+ 7	59.2	-0.8373	0.5862	-14	-70
934	6.4	6	08	36.46	18	08	16.3	8	14	9	+10	50.4	+1.1259	0.5871	+90	+50
940	5.7	6	09	34.24	+19	47	57.2	8	38	9	+11	13.5	-0.6014	0.5873	+ 1	-59
943	6.2	6	11	07.33	18	41	26.0	9	17	4	+11	50.6	+0.5160	0.5874	+71	+ 9
947	5.2	6	12	24.77	19	10	11.6	9	49	5	-11	38.6	+0.0010	0.5876	+36	-19
951	6.8	6	13	15.89	18	18	34.8	10	10	6	+0	87.22	0.5877	0.0411	+90	+30
1029	5.1	6	39	59.82	17	41	06.4	21	11	2	- 0	42.5	+0.9292	0.5904	+90	+32
1040	6.2	6	44	58.47	+18	14	15.1	23	13	7	+ 1	15.3	+0.2298	0.5908	+50	- 9
1072	6.2	7	00	01.26	17	48	49.4	2	5	23.2	+ 7	10.7	+0.2047	0.5917	+48	-12
1106	3.6	7	15	43.11	16	36	51.4	11	47	7	-10	39.4	+0.8651	0.5923	+90	+25
1141	5.6	7	29	25.47	17	10	23.7	17	23	1	- 5	16.8	-0.2512	0.5927	+22	-39
1147	5.1	7	31	15.02	15	54	54.0	18	07	7	- 4	33.9	+0.9417	0.5927	+90	+29
1158	5.2	7	37	05.51	+17	46	05.1	20	30	6	- 2	16.4	-1.1839	0.5927	-42	-73
1197	6.0	7	54	38.78	15	54	00.4	3	40	0	+ 4	36.6	-0.1329	0.5927	+28	-34
1198	6.2	7	56	10.16	16	37	45.3	4	17	3	+ 5	12.5	-0.9419	0.5926	-20	-74
1210	5.9	7	59	09.07	16	34	07.1	5	30	3	+ 6	22.7	-1.0323	0.5926	-27	-74
1234	6.1	8	08	39.74	14	45	04.5	9	23	2	+10	06.8	+0.2890	0.5924	+53	-12
1237	6.4	8	10	03.57	+14	07	37.5	9	57	5	+10	39.7	+0.8381	0.5924	+90	+19
1465	6.3	9	55	56.41	8	30	38.8	5	5	40.0	+ 4	43.5	-0.7961	0.5853	- 9	-82
1468	4.9	9	58	01.94	8	14	31.4	6	32	5	+ 5	34.1	-0.6971	0.5852	- 3	-82
1482	6.3	10	04	37.92	5	48	45.5	9	18	4	+ 8	13.8	+1.1729	0.5846	+90	+38
1518	6.3	10	20	50.81	6	45	07.5	16	07	2	- 9	12.4	-1.0856	0.5833	-29	-84
1519	6.5	10	21	05.99	+ 5	54	13.2	16	13	6	- 9	06.3	-0.2689	0.5832	+21	-51
1565	6.3	10	41	12.28	4	57	52.0	6	0	43.0	- 0	55.6	-1.0373	0.5816	-25	-86
1611	5.7	11	04	47.77	2	10	47.4	10	43	9	+ 8	43.3	-0.3230	0.5799	+18	-55
1623	5.4	11	11	38.63	0	09	19.7	13	38	9	+11	31.9	+1.0805	0.5795	+90	+28
1635	5.4	11	15	09.75	2	14	15.9	15	08	9	-11	01.3	-1.2844	0.5793	-50	-88
1637	6.0	11	16	47.63	+ 1	52	37.1	15	50	6	-10	21.1	-1.0704	0.5792	-27	-89
1649	6.3	11	21	10.93	0	21	31.8	17	43	0	- 8	32.8	+0.0464	0.5790	+38	-33
1652	5.5	11	21	55.03	+ 1	38	05.1	18	01	8	- 8	14.7	-1.2793	0.5789	-49	-89
1685	4.5	11	34	49.89	- 0	35	43.4	23	33	0	- 2	55.5	-0.2042	0.5782	+25	-48
1688	6.3	11	36	17.29	2	12	25.5	7	0	10.3	- 2	19.5	+1.2635	0.5781	+88	+47
1744	6.5	12	03	52.63	- 2	54	03.3	11	59	9	+ 9	04.4	-0.4477	0.5770	+11	-64
1787	6.0	12	25	43.99	4	23	09.8	21	23	1	- 5	52.6	-0.8391	0.5764	-12	-90
1798	6.3	12	29	30.87	4	49	26.4	23	00	7	- 4	18.6	-0.7215	0.5764	- 5	-90
1807	5.9	12	34	39.28	5	36	12.2	8	1	13.2	- 2	10.8	-0.3751	0.5763	+14	-59
1836	6.3	12	45	24.83	6	04	29.7	5	50	8	+ 2	16.7	-0.7936	0.5762	-10	-90
1886	5.7	13	06	22.63	- 8	45	43.7	14	51	4	+10	57.9	+0.2124	0.5762	+46	-24
1887	6.4	13	07	04.31	9	19	00.9	15	09	3	+11	15.1	+0.7137	0.5761	+81	+ 4
1925	1.2	13	23	00.35	10	56	40.1	22	00	0	- 6	09.0	+1.1264	0.5762	+80	+33
1945	5.4	13	30	46.78	9	57	03.9	9	1	20.3	- 2	56.0	-0.4494	0.5763	+ 8	-64
1971	5.8	13	43	43.43	12	13	05.7	6	53	5	+ 2	25.2	+0.9016	0.5764	+78	+16
2053	4.6	14	16	51.46	-13	10	46.7	21	04	8	- 7	54.3	-0.3278	0.5771	+12	-56
2117	5.3	14	48	22.90	15	49	26.7	10	10	32.6	+ 5	04.3	+0.5443	0.5777	+62	- 5
2118	2.9	14	48	34.40	15	52	07.2	10	37	6	+ 5	09.0	+0.5797	0.5776	+64	- 3
2159	5.3	15	04	18.02	16	05	42.8	17	20	0	+11	36.8	+0.0139	0.5778	+27	-35
2182	6.3	15	12	12.50	17	36	46.1	20	42	2	- 9	08.3	+1.1997	0.5779	+73	+44
2209	5.9	15	25	54.19	-16	34	16.0	11	2	32.4	- 3	30.9	-0.4696	0.5780	- 1	-67
2213	5.9	15	28	19.15	16	27	59.3	3	34	2	- 2	31.4	-0.6771	0.5780	-13	-89
2218	5.6	15	30	33.72	16	42	40.8	4	31	5	- 1	36.1	-0.5155	0.5780	- 4	-71
2316	6.4	16	07	30.83	18	13	48.0	20	16	9	-10	25.1	-0.1980	0.5775	+11	-48
2322	4.3	16	09	33.99	-19	21	07.7	21	09	5	- 9	34.4	+0.9129	0.5774	+71	+19

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

FEBRUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	'
2331	6.4	16	12	14.50	-18	25	42.4	11	22	18.1	- 8	28.3	-0.1186	0.5774	-0.0609	+15	-43
2361	4.8	16	24	36.00	18	21	41.7	12	3	35.1	- 3	22.8	-0.4842	0.5769	0.0508	- 6	-68
2401	5.6	16	39	26.12	19	50	39.2		9	56.4	+ 2	44.8	+0.7813	0.5763	0.0386	+71	+10
2425	5.9	16	50	56.95	20	20	44.2		14	53.2	+ 7	30.8	+1.1418	0.5756	0.0290	+70	+39
2436	6.3	16	54	36.45	19	28	25.3		16	27.7	+ 9	01.9	+0.1841	0.5753	0.0260	+28	-25
2448	6.4	16	59	24.32	-18	49	27.3		18	31.7	+11	01.4	-0.5477	0.5750	-0.0220	-13	-74
2456	6.2	17	02	16.53	20	26	09.3		19	45.9	-11	47.0	+1.1208	0.5748	-0.0195	+70	+37
2578	6.4	17	53	27.04	18	47	42.1	13	18	02.1	+ 9	41.7	-0.5714	0.5698	+0.0229	-14	-77
2591	6.5	17	57	30.49	20	20	10.5		19	49.2	+11	25.1	+1.1099	0.5694	0.0262	+70	+36
2629	6.3	18	08	45.69	19	51	01.5	14	0	47.4	- 7	47.2	+0.7478	0.5679	0.0353	+71	+ 8
2640	6.1	18	13	03.00	-18	40	28.4		2	41.5	- 5	57.1	-0.4345	0.5673	+0.0388	- 5	-64
2647	6.4	18	15	00.97	18	28	42.2		3	33.9	- 5	06.5	-0.6093	0.5670	0.0403	-14	-81
2653	6.4	18	16	15.54	18	38	08.4		4	07.0	- 4	34.5	-0.4192	0.5669	0.0413	- 3	-63
2658	5.4-6.2	18	18	55.01	18	52	43.8		5	18.0	- 3	26.0	-0.1098	0.5665	0.0434	+13	-42
2674	6.0	18	25	29.64	17	49	33.3		8	14.0	- 0	36.1	-1.0996	0.5656	0.0486	-47	-90
2680	5.8	18	27	43.90	-18	45	20.3		9	14.1	+ 0	21.9	-0.0569	0.5652	+0.0504	+17	-39
2686	5.2	18	28	58.82	18	25	53.4		9	47.6	+ 0	54.3	-0.3750	0.5650	0.0514	0	-60
2687	6.5-7.3	18	29	25.08	19	09	16.5		9	59.4	+ 1	05.6	+0.4081	0.5649	0.0517	+45	-13
2715	6.5	18	40	26.85	19	19	27.9		14	56.8	+ 5	52.8	+0.8687	0.5632	0.0603	+71	+16
2731	6.5	18	46	17.87	18	38	51.4		17	35.3	+ 8	25.9	+0.3092	0.5622	0.0648	+40	-18
2733	6.4	18	47	07.26	-19	11	21.8		17	57.7	+ 8	47.5	+0.9145	0.5621	+0.0654	+71	+19
2764	6.3	18	56	59.45	18	37	23.6		22	26.6	-10	52.7	+0.6179	0.5605	0.0728	+63	- 1
2787	6.4	19	04	40.97	18	48	09.3	15	1	57.4	- 7	29.0	+0.1077	0.5591	0.0785	+72	+32
2826	4.0	19	19	14.26	17	55	34.3		8	39.3	- 1	00.6	+0.6972	0.5565	0.0890	+71	+ 4
2828	6.0	19	19	23.96	18	23	10.8		8	43.8	- 0	56.2	+1.2000	0.5565	0.0891	+72	+45
2876	5.4	19	38	19.03	-16	23	21.7		17	32.4	+ 7	35.0	-0.1119	0.5529	+0.1021	+19	-42
2880	5.1	19	40	06.98	16	13	20.5		18	23.1	+ 8	24.0	-0.2059	0.5525	0.1033	+14	-48
2883	5.5	19	41	09.83	15	34	02.3		18	52.6	+ 8	52.5	-0.8637	0.5523	0.1040	-23	-90
2913	5.0	19	55	34.07	15	36	10.2	16	1	41.0	- 8	32.4	-0.0863	0.5495	0.1133	+22	-41
2968	6.2	20	18	24.86	14	55	02.5		12	37.9	+ 2	03.5	+0.4875	0.5450	0.1271	+59	- 8
2969	3.2	20	18	39.03	-14	54	50.4		12	44.7	+ 2	10.1	+0.4984	0.5449	+0.1273	+59	- 8
3455	6.4	23	25	05.56	+ 0	53	31.1	20	12	39.9	- 0	45.4	-1.1394	0.5178	0.1821	-33	-90
3462	7.5	23	28	31.37	0	38	45.7		14	30.2	+ 1	01.8	-0.5318	0.5177	0.1820	+ 7	-71
3477	6.6	23	33	19.60	1	04	52.9		17	04.8	+ 3	32.0	-0.5464	0.5175	0.1819	+ 6	-72
3494	4.6	23	39	54.08	1	32	56.9		20	36.4	+ 6	57.6	-0.4250	0.5173	0.1816	+12	-62
3507	6.4	23	46	40.23	+ 1	58	53.4	21	0	14.3	+10	29.3	-0.2466	0.5173	+0.1811	+22	-50
3508	5.8	23	47	18.32	0	50	35.0		0	34.8	+10	49.2	+1.0796	0.5173	0.1810	+90	+29
3512	5.8	23	49	48.72	2	41	49.1		1	55.5	-11	52.4	-0.7364	0.5172	0.1808	- 5	-88
3515	6.2	23	50	55.57	1	51	26.3		2	31.4	-11	17.5	+0.3044	0.5172	0.1807	+54	-19
6	6.9	0	03	13.08	3	22	21.3		9	07.0	- 4	53.1	-0.1925	0.5174	0.1792	+25	-46
30	7.0	0	13	47.88	+ 4	01	04.5		14	47.1	+ 0	37.3	+0.1017	0.5176	+0.1775	+41	-29
64	6.6	0	27	59.06	4	37	40.3		22	22.1	+ 7	59.4	+0.7603	0.5182	0.1748	+90	+ 8
98	6.2	0	45	13.31	6	30	43.0	22	7	32.7	- 7	05.7	+0.2524	0.5194	0.1705	+51	-20
103	6.1	0	46	06.66	7	04	15.5		8	01.0	- 6	38.2	-0.2880	0.5194	0.1703	+20	-51
105	4.6	0	46	30.24	7	21	24.8		8	13.6	- 6	26.0	-0.5700	0.5195	0.1702	+ 4	-72
132	6.9	0	56	08.79	+ 6	37	04.2		13	20.0	- 1	28.4	+1.1128	0.5203	+0.1674	+90	+33
143	6.8	1	00	18.55	8	35	46.5		15	31.9	+ 0	39.7	-0.7167	0.5207	0.1661	- 4	-82
145	6.7	1	00	31.18	8	54	27.5		15	38.6	+ 0	46.2	-1.0439	0.5208	0.1660	-26	-82
146	4.4	1	00	45.89	7	39	51.9		15	46.4	+ 0	53.8	+0.3575	0.5208	0.1660	+57	-14
162	6.9	1	04	26.58	8	08	09.9		17	42.7	+ 2	46.7	+0.1546	0.5212	0.1648	+44	-25
186	7.1	1	13	35.06	+ 9	33	46.0		22	31.0	+ 7	26.7	-0.6437	0.5222	+0.1616	0	-76
201	7.5	1	20	31.37	10	09	04.5	23	2	08.9	+10	58.3	-0.7133	0.5231	0.1591	- 4	-80
209	7.2	1	23	45.64	10	11	19.9		3	50.3	-11	23.3	-0.4870	0.5235	0.1579	+ 9	-63
252	7.4	1	40	22.82	10	01	59.9		12	28.0	- 3	00.8	+1.0183	0.5259	0.1511	+90	+28
264	7.0	1	44	55.65	+10	38	05.4		14	48.7	- 0	44.3	+0.7045	0.5266	+0.1491	+90	+ 7

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

FEBRUARY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
272	5.9	1 48	38.50		+10 50	09.1		23	16	43.3	+ 1	07.0	+0.7652	0.5272	+0.1475	+90	+11
279	7.1	1 51	15.44		12 28	34.8			18	03.9	+ 2	25.1	-0.8514	0.5276	0.1463	-13	-78
284	7.4	1 52	10.57		11 11	47.1			18	32.2	+ 2	52.6	+0.6323	0.5278	0.1458	+81	+ 4
290	6.1	1 57	11.24		12 05	30.1			21	06.0	+ 5	21.8	+0.0138	0.5287	0.1435	+36	-30
299	6.3	2 00	19.73		13 16	29.3			22	42.2	+ 6	55.1	-1.0640	0.5291	0.1420	-29	-77
325	7.4	2 10	26.53		+13 43	19.4		24	3	50.4	+11	54.1	-0.8399	0.5310	+0.1370	-12	-77
340	7.1	2 16	35.81		12 47	54.7			6	56.9	- 9	05.1	+0.5991	0.5321	0.1338	+78	+ 3
374	6.1	2 30	36.60		14 50	57.9			13	58.3	- 2	16.6	-0.7453	0.5347	0.1262	- 7	-76
380	7.4	2 33	44.27		13 34	19.9			15	31.7	- 0	46.1	+0.8541	0.5354	0.1244	+90	+20
391	7.4	2 36	41.94		14 40	46.3			16	59.9	+ 0	39.5	-0.1812	0.5360	0.1228	+25	-38
403	5.8	2 42	14.59		+15 08	05.0			19	44.6	+ 3	19.0	-0.3484	0.5371	+0.1195	+16	-48
413	6.8	2 45	40.75		15 19	59.7			21	26.3	+ 4	57.6	-0.3652	0.5379	0.1175	+15	-49
422	5.5	2 49	11.01		14 54	34.7			23	09.7	+ 6	37.8	+0.3002	0.5386	0.1154	+54	-11
423	6.4	2 50	51.94		16 18	46.2			23	59.2	+ 7	25.8	-1.1430	0.5389	0.1144	-37	-74
434	6.9	2 55	08.79		16 07	32.3		25	2	05.0	+ 9	27.6	-0.7001	0.5398	0.1118	- 4	-74
445	7.3	2 58	34.77		+14 51	56.9			3	45.6	+11	05.0	+0.8649	0.5406	+0.1097	+90	+22
450	6.6	3 02	21.08		15 41	37.8			5	35.7	-11	08.3	+0.1577	0.5414	0.1074	+45	-18
466	7.3	3 10	04.45		16 21	33.0			9	20.2	- 7	31.0	-0.1771	0.5431	0.1024	+26	-36
469	7.3	3 11	48.54		15 26	02.5			10	10.4	- 6	42.4	+0.9184	0.5434	0.1013	+90	+27
505	7.0	3 27	21.10		16 37	05.1			17	37.2	+ 0	30.1	+0.3419	0.5468	0.0910	+57	- 6
510	7.2	3 28	58.71		+17 47	43.0			18	23.6	+ 1	15.1	-0.8691	0.5472	+0.0899	-15	-73
517	6.4	3 31	45.62		17 41	44.6			19	42.9	+ 2	31.8	-0.6429	0.5478	0.0880	- 1	-67
527	6.3	3 37	04.06		16 24	01.8			22	13.6	+ 4	57.6	+0.9810	0.5490	0.0843	+90	+33
532	7.2	3 40	14.94		17 09	33.4			23	43.7	+ 6	24.7	+0.2816	0.5496	0.0821	+53	- 8
577	6.0	3 50	46.85		17 12	08.8		26	4	40.0	+11	11.4	+0.6208	0.5519	0.0746	+82	+11
590	6.3	3 58	13.88		+17 10	42.7			8	08.2	- 9	27.4	+0.8948	0.5537	+0.0692	+90	+29
593	5.8	3 58	24.56		18 04	33.7			8	13.1	- 9	22.6	-0.0696	0.5537	0.0691	+32	-26
600	6.8	4 02	16.34		17 24	09.7			10	00.6	- 7	38.7	+0.7787	0.5545	0.0662	+90	+22
610	6.2	4 05	36.14		17 13	40.6			11	32.9	- 6	09.5	+1.0666	0.5552	0.0638	+90	+42
617	6.6	4 08	17.59		18 18	50.3			12	47.3	- 4	57.5	-0.0274	0.5558	0.0618	+34	-23
629	7.5	4 15	37.08		+18 09	14.8			16	09.2	- 1	42.5	+0.3431	0.5574	+0.0562	+57	- 2
639	6.0	4 17	59.78		18 38	32.5			17	14.5	- 0	39.4	-0.1222	0.5579	0.0544	+29	-28
643	6.7	4 19	07.23		18 19	05.4			17	45.3	- 0	09.6	+0.2543	0.5582	0.0536	+51	- 7
654	6.0	4 22	31.39		18 56	44.7			19	18.4	+ 1	20.4	-0.3392	0.5589	0.0510	+16	-40
658	4.2	4 23	04.72		17 49	56.2			19	33.6	+ 1	35.0	+0.8701	0.5590	0.0506	+90	+29
663	6.9	4 24	40.16		+18 06	46.8			20	17.0	+ 2	17.0	+0.6044	0.5593	+0.0493	+80	+13
668	3.6	4 26	11.01		19 05	15.6			20	58.3	+ 2	56.9	-0.4087	0.5596	0.0482	+12	-45
684	6.2	4 31	08.25		17 55	41.8			23	13.1	+ 5	07.1	+0.9389	0.5607	0.0443	+90	+34
691	6.6	4 33	16.02		19 47	44.1		27	0	10.9	+ 6	02.9	-1.0209	0.5611	0.0427	-27	-71
697	7.2-7.4	4 34	49.56		18 27	28.3			0	53.1	+ 6	43.7	+0.4422	0.5614	0.0415	+65	+ 5
710	7.1	4 40	25.82		+18 38	30.3			3	24.6	+ 9	10.0	+0.3439	0.5626	+0.0371	+57	0
718	6.1	4 43	50.93		18 39	32.2			4	56.7	+10	38.9	+0.3801	0.5632	0.0344	+60	+ 2
726	6.8	4 46	15.89		18 38	22.8			6	01.6	+11	41.6	+0.4366	0.5638	0.0325	+64	+ 5
730	5.1	4 48	56.36		18 46	06.3			7	13.4	-11	09.1	+0.3364	0.5643	0.0303	+57	0
736	6.2	4 52	31.56		19 25	02.8			8	49.4	- 9	36.4	-0.3096	0.5650	0.0275	+18	-36
760	6.5	5 03	04.95		+19 44	55.8			13	30.7	- 5	04.9	-0.5522	0.5670	+0.0190	+ 4	-53
764	5.0	5 04	59.48		18 35	19.2			14	21.4	- 4	16.0	+0.6962	0.5674	0.0174	+90	+21
765	5.3	5 05	20.66		20 21	47.3			14	30.7	- 4	06.9	-1.1865	0.5675	0.0171	-45	-70
769	6.6	5 06	23.15		19 48	19.0			14	58.4	- 3	40.3	-0.5859	0.5677	0.0163	+ 2	-56
787	7.5	5 14	17.95		18 23	32.1			18	27.5	- 0	18.5	+0.9585	0.5691	0.0099	+90	+39
790	6.9	5 15	03.53		+20 05	12.0			18	47.5	+ 0	00.8	-0.8339	0.5693	+0.0093	-14	-70
793	6.2	5 16	47.10		20 05	25.7			19	33.0	+ 0	44.7	-0.8311	0.5695	0.0078	-13	-70
796	6.8	5 17	51.13		19 32	06.0			20	01.1	+ 1	11.8	-0.2392	0.5697	0.0069	+22	-30
798	6.4	5 18	29.22		19 46	17.0			20	17.8	+ 1	27.9	-0.4876	0.5699	0.0064	+ 8	-47
800	7.5	5 19	13.49		+18 51	53.6			20	37.2	+ 1	46.6	+0.4739	0.5700	+0.0059	+68	+10

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

FEBRUARY-MARCH

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
823	6.6	5 26	53.27		+18 19	52.1		27 23	58.1		+ 5 00.5		+1.0456	0.5713	-0.0005	+90	+47
832	4.7	5 29	46.58		18 33	46.0		28 1	13.6		+ 6 13.3		+0.7982	0.5718	0.0028	+90	+29
836	5.5	5 31	05.50		18 30	35.8			1 48.0		+ 6 46.4		+0.8517	0.5720	0.0039	+90	+32
837	6.1	5 31	10.59		20 26	39.6			1 50.2		+ 6 48.5		-1.1888	0.5721	0.0040	-46	-70
862	7.5	5 40	02.13		18 58	00.0			5 40.8		+10 31.0		+0.3394	0.5735	0.0114	+57	+ 2
863	6.7	5 40	27.06		+18 57	34.6			5 51.6		+10 41.4		+0.3447	0.5736	-0.0117	+58	+ 2
871	6.9	5 42	45.17		18 41	08.9			6 51.4		+11 39.0		+0.6197	0.5739	0.0136	+82	+17
886	7.0	5 48	38.40		18 32	19.1			9 23.8		- 9 54.1		+0.7324	0.5749	0.0185	+90	+24
888	6.0	5 49	55.85		19 51	23.7			9 57.2		- 9 21.9		-0.6610	0.5751	0.0196	- 2	-63
892	6.6	5 50	50.92		20 17	20.0		10 20.9			- 8 59.0		-1.1221	0.5752	0.0203	-37	-70
894	4.6	5 51	55.44		+20 16	05.1		10 48.7			- 8 32.3		-1.1096	0.5754	-0.0212	-36	-70
895	5.9	5 52	29.23		19 44	27.5		11 03.2			- 8 18.3		-0.5620	0.5754	0.0217	+ 4	-54
904	7.1	5 56	28.25		18 48	55.4		12 45.9			- 6 39.3		+0.3678	0.5760	0.0250	+59	+ 2
913	5.2	6 00	59.96		19 41	26.5		14 42.4			- 4 47.0		-0.6001	0.5767	0.0288	+ 1	-58
915	4.7	6 01	27.32		20 08	19.7		14 54.1			- 4 35.7		-1.0742	0.5767	0.0291	-32	-70
934	6.4	6 08	36.12		+18 08	16.2		17 57.4			- 1 39.0		+0.9177	0.5777	-0.0351	+90	+34
940	5.7	6 09	33.89		19 47	57.3		18 22.1			- 1 15.2		-0.8301	0.5778	0.0359	-13	-71
943	6.2	6 11	06.99		18 41	26.0		19 01.8			- 0 37.0		+0.3021	0.5781	0.0372	+54	- 2
944	5.7	6 12	03.24		17 55	02.3		19 25.8			- 0 13.9		+1.0929	0.5782	0.0380	+90	+47
947	5.2	6 12	24.43		19 10	11.6		19 34.8			- 0 05.2		-0.2184	0.5782	0.0382	+23	-32
951	6.8	6 13	15.56		+18 18	34.8		19 56.6			+ 0 15.8		+0.6640	0.5784	-0.0390	+88	+18
970	6.5	6 19	00.74		17 46	54.7		22 23.5			+ 2 37.4		+1.1107	0.5791	0.0437	+90	+48
971	7.3	6 19	08.20		19 54	37.1		22 26.6			+ 2 40.4		-1.1055	0.5791	0.0439	-35	-71
985	6.9	6 23	44.42		18 46	52.7		1 0 23.9			+ 4 33.4		-0.0207	0.5797	0.0476	+34	-21
1003	7.2	6 29	53.39		17 48	46.0		3 00.2			+ 7 04.0		+0.8529	0.5804	0.0527	+90	+28
1006	6.9	6 32	12.51		+19 27	37.2		3 59.1			+ 8 00.7		-0.9074	0.5807	-0.0546	-18	-71
1011	7.4	6 33	28.97		17 43	29.8		4 31.4			+ 8 31.8		+0.8606	0.5808	0.0557	+90	+28
1029	5.1	6 39	59.53		17 41	06.4		7 16.3			+11 10.7		+0.7399	0.5815	0.0610	+90	+20
1038	6.8	6 43	55.15		18 52	50.3		8 55.6			-11 13.7		-0.5990	0.5818	0.0642	+ 2	-61
1040	6.2	6 44	58.19		18 14	15.2		9 22.1			-10 48.1		+0.0364	0.5820	0.0651	+38	-19
1057	6.9	6 53	52.04		+17 47	24.5		13 06.6			- 7 12.0		+0.2401	0.5828	-0.0724	+50	- 9
1072	6.2	7 00	01.01		17 48	49.5		15 41.4			- 4 42.9		+0.0225	0.5834	0.0773	+37	-21
1073	6.0	7 00	09.95		16 43	59.0		15 45.2			- 4 39.3		+1.1282	0.5835	0.0774	+90	+47
1091	6.7	7 09	23.38		17 02	39.0		19 36.9			- 0 56.1		+0.4935	0.5841	0.0848	+69	+ 4
1104	6.8	7 14	22.10		16 13	08.2		21 41.8			+ 1 04.1		+1.1569	0.5845	0.0887	+90	+49
1106	3.6	7 15	42.88		+16 36	51.4		22 15.5			+ 1 36.6		+0.7018	0.5846	-0.0898	+90	+15
1116	7.4	7 20	42.12		17 29	17.2		2 0 20.4			+ 3 36.9		-0.3827	0.5850	0.0937	+14	-47
1141	5.6	7 29	25.27		17 10	23.8		3 58.5			+ 7 06.9		-0.4133	0.5855	0.1004	+12	-50
1145	6.7	7 31	03.17		15 43	37.1		4 39.3			+ 7 46.1		+0.9913	0.5856	0.1016	+90	+33
1147	5.1	7 31	14.83		15 54	53.9		4 44.2			+ 7 50.8		+0.7916	0.5856	0.1018	+90	+19
1176	7.4	7 43	47.45		+16 32	17.4		9 57.3			-11 07.8		-0.3989	0.5863	-0.1113	+13	-50
1183	7.2	7 48	11.53		14 56	42.8		11 47.0			- 9 22.1		+1.0098	0.5864	0.1146	+90	+33
1190	7.1	7 51	36.49		16 08	34.5		13 12.2			- 8 00.2		-0.3682	0.5866	0.1170	+15	-48
1197	6.0	7 54	38.64		15 54	00.4		14 27.8			- 6 47.3		-0.2711	0.5867	0.1193	+20	-42
1198	6.2	7 56	10.02		16 37	45.3		15 05.8			- 6 10.8		-1.0842	0.5867	0.1204	-31	-74
1210	5.9	7 59	08.93		+16 34	07.1		16 20.0			- 4 59.4		-1.1723	0.5869	-0.1225	-40	-74
1212	7.1	8 00	22.75		15 03	48.7		16 50.7			- 4 29.9		+0.2859	0.5869	0.1234	+53	-11
1234	6.1	8 08	39.63		14 45	04.3		20 16.8			- 1 11.5		+0.1667	0.5872	0.1292	+45	-18
1237	6.4	8 10	03.47		14 07	37.2		20 51.5			- 0 38.0		+0.7204	0.5873	0.1302	+90	+12
1271	5.9	8 26	19.07		14 20	49.5		3 35.9			+ 5 51.3		-0.4161	0.5875	0.1411	+12	-54
1281	6.4	8 31	27.80		+13 23	52.6		5 43.9			+ 7 54.4		+0.2313	0.5877	-0.1445	+49	-17
1309	5.7	8 40	55.88		12 49	42.1		9 39.2			+11 40.9		+0.2224	0.5878	0.1505	+49	-18
1318	5.7	8 44	40.26		12 15	39.0		11 12.2			-10 49.6		+0.5544	0.5878	0.1527	+73	0
1332	5.7	8 53	40.35		11 46	59.8		14 55.9			- 7 14.2		+0.4504	0.5878	0.1581	+64	- 6
1341	4.3	8 56	13.82		+12 01	01.4		15 59.5			- 6 13.0		+0.0489	0.5879	-0.1596	+38	-28

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

MARCH

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
1359	5.1	9	05	30.74	+10	50	01.6	3	19	50.3	- 2	30.9	+0.6021	0.5879	-0.1647	+78	+ 2
1364	6.5	9	07	31.86	11	43	54.7		20	40.5	- 1	42.6	-0.4289	0.5879	0.1659	+12	-58
1381	6.3	9	15	37.10	11	40	24.5	4	0	01.7	+ 1	31.0	-0.9330	0.5878	0.1701	-18	-79
1397	5.5	9	26	14.89	9	11	09.4		4	26.1	+ 5	45.6	+0.7216	0.5878	0.1754	+90	+ 8
1410	5.3	9	29	44.95	9	53	50.1		5	53.3	+ 7	09.5	-0.1891	0.5878	0.1770	+25	-43
1428	3.8	9	38	57.00	+10	04	46.3		9	42.4	+10	50.0	-1.0522	0.5876	-0.1812	-27	-80
1465	6.3	9	55	56.57	8	30	37.5		16	45.7	- 6	22.5	-0.8051	0.5875	0.1880	-10	-82
1468	4.9	9	58	02.10	8	14	30.0		17	37.9	- 5	32.3	-0.7040	0.5874	0.1888	- 3	-82
1482	6.3	10	04	38.09	+ 5	48	43.6		20	22.4	- 2	53.9	+1.1662	0.5874	0.1911	+90	+38
1735	6.4	11	58	55.02	- 1	32	15.9	6	19	57.1	- 5	05.7	-1.2332	0.5870	0.2030	-44	-90
1744	6.5	12	03	53.09	- 2	54	06.6		22	01.1	- 3	06.3	-0.3174	0.5871	-0.2022	+18	-55
1787	6.0	12	25	44.50	4	23	13.4	7	7	06.4	+ 5	38.7	-0.6827	0.5873	0.1977	- 3	-86
1798	6.3	12	29	31.38	4	49	30.0		8	40.7	+ 7	09.4	-0.5634	0.5874	0.1968	+ 4	-73
1807	5.9	12	34	39.81	5	36	15.9		10	48.8	+ 9	12.8	-0.2179	0.5875	0.1953	+23	-48
1836	6.3	12	45	25.38	6	04	33.4		15	16.8	-10	29.3	-0.6208	0.5876	0.1920	0	-79
1886	5.7	13	06	23.22	- 8	45	47.7		23	58.2	- 2	07.4	+0.3849	0.5880	-0.1843	+57	-15
1887	6.4	13	07	04.90	9	19	05.0	8	0	15.5	- 1	50.8	+0.8783	0.5880	0.1840	+81	+14
1945	5.4	13	30	47.42	9	57	07.9		10	04.1	+ 7	35.7	-0.2493	0.5884	0.1733	+18	-50
1971	5.8	13	43	44.10	12	13	09.8		15	25.0	-11	15.5	+1.0860	0.5886	0.1667	+78	+30
2053	4.6	14	16	52.19	13	10	50.5	9	5	05.1	+ 1	53.7	-0.1055	0.5889	0.1474	+24	-42
2114	5.8	14	47	02.79	-13	58	36.4		17	31.1	-10	08.4	-1.0228	0.5887	-0.1273	-33	-90
2117	5.3	14	48	23.68	15	49	30.4		18	04.4	- 9	36.3	+0.7636	0.5887	0.1264	+75	+ 8
2118	2.9	14	48	35.18	15	52	10.9		18	09.2	- 9	31.8	+0.7985	0.5887	0.1262	+75	+10
2159	5.3	15	04	18.82	16	05	46.3	10	0	38.1	- 3	17.5	+0.2466	0.5884	0.1149	+40	-22
2193	6.1	15	18	42.23	15	23	56.5		6	34.2	+ 2	25.2	-1.1099	0.5880	0.1042	-43	-90
2209	5.9	15	25	55.00	-16	34	19.1		9	32.9	+ 5	17.2	-0.2247	0.5877	-0.0987	+12	-49
2213	5.9	15	28	19.97	16	28	02.4		10	32.8	+ 6	14.8	-0.4286	0.5876	0.0968	+ 1	-63
2218	5.6	15	30	34.55	16	42	43.9		11	28.4	+ 7	08.4	-0.2692	0.5875	0.0951	+10	-52
2271	4.3	15	51	27.65	16	36	28.0		20	07.1	- 8	32.4	-1.1303	0.5864	0.0786	-47	-90
2316	6.4	16	07	31.68	18	13	50.5	11	2	47.5	- 2	06.9	+0.0468	0.5853	0.0655	+24	-33
2322	4.3	16	09	34.84	-19	21	10.2		3	38.8	- 1	17.6	+1.1428	0.5851	-0.0639	+71	+39
2331	6.4	16	12	15.35	18	25	44.9		4	45.7	- 0	13.2	+0.1253	0.5849	0.0617	+28	-28
2361	4.8	16	24	36.85	18	21	44.0		9	55.1	+ 4	44.7	-0.2358	0.5838	0.0515	+ 7	-50
2401	5.6	16	39	26.98	19	50	41.1		16	08.2	+10	44.0	+1.0138	0.5823	0.0392	+71	+27
2436	6.3	16	54	37.30	19	28	27.0		22	31.8	- 7	06.6	+0.4225	0.5806	0.0266	+44	-11
2441	6.5	16	57	18.94	-18	11	03.0		23	40.1	- 6	00.7	-0.9467	0.5803	-0.0243	-37	-90
2448	6.4	16	59	25.17	18	49	28.9	12	0	33.5	- 5	09.3	-0.3021	0.5799	0.0226	+ 1	-54
2508	6.3	17	22	10.76	18	24	27.3		10	14.8	+ 4	10.9	-0.8669	0.5768	-0.0036	-34	-90
2578	6.4	17	53	27.86	18	47	42.8		23	45.1	- 6	47.9	-0.3385	0.5718	+0.0221	- 1	-57
2629	6.3	18	08	46.51	19	51	01.7	13	6	27.2	- 0	20.0	+0.9675	0.5692	0.0345	+71	+23
2640	6.1	18	13	03.80	-18	40	28.7		8	20.5	+ 1	29.3	-0.2092	0.5683	+0.0379	+ 8	-48
2647	6.4	18	15	01.77	18	28	42.5		9	12.6	+ 2	19.6	-0.3838	0.5680	0.0394	- 2	-60
2653	6.4	18	16	16.34	18	38	08.6		9	45.6	+ 2	51.4	-0.1952	0.5678	0.0404	+ 9	-47
2658	5.4-6.2	18	18	55.80	18	52	44.0		10	56.1	+ 3	59.5	+0.1115	0.5672	0.0425	+26	-29
2674	6.0	18	25	30.42	17	49	33.5		13	51.3	+ 6	48.5	-0.8758	0.5659	0.0477	-30	-90
2680	5.8	18	27	44.68	-18	45	20.3		14	51.1	+ 7	46.2	+0.1608	0.5655	+0.0494	+29	-26
2686	5.2	18	28	59.60	18	25	53.4		15	24.5	+ 8	18.5	-0.1562	0.5653	0.0504	+12	-45
2687	6.5-7.3	18	29	25.87	19	09	16.5		15	36.2	+ 8	29.8	+0.6230	0.5652	0.0507	+62	0
2715	6.5	18	40	27.62	19	19	27.6		20	32.6	-10	44.0	+1.0774	0.5630	0.0591	+71	+32
2731	6.5	18	46	18.63	18	38	51.1		23	10.8	- 8	11.3	+0.5178	0.5618	0.0635	+54	- 6
2733	6.4	18	47	08.02	-19	11	21.5		23	33.1	- 7	49.7	+1.1205	0.5617	+0.0642	+71	+37
2764	6.3	18	57	00.19	18	37	23.1	14	4	01.7	- 3	30.2	+0.8208	0.5596	0.0715	+72	+12
2826	4.0	19	19	14.97	17	55	33.6		14	14.9	+ 6	22.4	+0.8893	0.5549	0.0874	+73	+17
2827	4.6	19	19	20.05	16	02	01.4		14	17.3	+ 6	24.7	-1.1439	0.5549	0.0874	-47	-90
2876	5.4	19	38	19.69	-16	23	20.9		23	09.6	- 9	00.5	+0.0706	0.5507	+0.1003	+29	-31

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

MARCH

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
2880	5.1	19	40	07.64	-16	13	19.7	15	0	00.4	- 8	11.3	-0.0244	0.5503	+0.1015	+24	-37
2883	5.5	19	41	10.48	15	34	01.6		0	30.1	- 7	42.6	-0.6823	0.5501	0.1021	-12	-90
2905	6.4	19	50	44.82	14	42	37.2		5	02.2	- 3	19.4	-1.1342	0.5480	0.1083	-43	-90
2913	5.0	19	55	34.69	15	36	09.2		7	20.3	- 1	05.7	+0.0850	0.5470	0.1113	+31	-31
2968	6.2	20	18	25.43	14	55	01.4		18	21.0	+ 9	33.9	+0.6432	0.5421	0.1249	+71	+ 1
2969	3.2	20	18	39.60	-14	54	49.2		18	27.9	+ 9	40.6	+0.6539	0.5421	+0.1250	+72	+ 1
3002	6.2	20	31	51.86	13	51	54.0	16	0	55.5	- 8	03.9	+0.3429	0.5394	0.1322	+49	-16
3045	6.0	20	48	23.27	12	42	01.1		9	06.3	- 0	08.3	+0.1874	0.5361	0.1407	+41	-25
3054	6.4	20	50	48.13	11	43	55.9		10	18.5	+ 1	01.7	-0.7024	0.5356	0.1419	- 9	-90
3093	4.5	21	07	18.68	11	32	29.5		18	36.0	+ 9	04.1	+0.2966	0.5325	0.1495	+49	-19
3104	6.5	21	12	00.72	-10	46	43.1		20	58.8	+11	22.6	-0.1829	0.5317	+0.1515	+21	-46
3128	6.2	21	20	41.45	9	29	53.0	17	1	23.7	- 8	20.6	-0.9143	0.5302	0.1551	-20	-90
3133	5.8	21	22	57.88	9	55	37.7		2	33.3	- 7	13.0	-0.2620	0.5298	0.1560	+18	-51
3185	5.3	21	42	46.06	9	16	30.4		12	44.3	+ 2	39.8	+0.6460	0.5267	0.1631	+77	0
3187	6.2	21	44	02.01	9	28	09.7		13	23.6	+ 3	18.0	+0.9673	0.5265	0.1636	+81	+21
3229	5.6	22	01	04.02	- 6	43	31.0		22	15.3	+11	54.2	-0.5885	0.5242	+0.1687	+ 2	-76
3272	5.8	22	14	55.05	5	35	48.0	18	5	31.3	- 5	02.5	-0.5983	0.5226	0.1722	+ 1	-77
3287	5.8	22	21	55.68	- 5	02	57.6		9	13.0	- 1	27.2	-0.5651	0.5219	0.1738	+ 4	-73
201	7.5	1	20	31.17	+10	09	03.2	22	8	15.9	- 5	07.3	-0.8355	0.5252	0.1584	-12	-80
209	7.2	1	23	45.44	10	11	18.5		9	57.1	- 3	29.1	-0.6110	0.5256	0.1571	+ 2	-73
252	7.4	1	40	22.58	+10	01	58.6		18	33.7	+ 4	52.4	+0.8861	0.5279	+0.1504	+90	+19
264	7.0	1	44	55.40	10	38	04.0		20	54.3	+ 7	08.7	+0.5690	0.5286	0.1484	+74	0
272	5.9	1	48	38.24	10	50	07.8		22	48.8	+ 8	59.8	+0.6276	0.5291	0.1467	+81	+ 3
279	7.1	1	51	15.18	12	28	33.3	23	0	09.3	+10	17.9	-0.9939	0.5295	0.1456	-23	-78
284	7.4	1	52	10.31	11	11	45.8		0	37.5	+10	45.3	+0.4924	0.5297	0.1452	+68	- 4
290	6.1	1	57	10.97	+12	05	28.6		3	11.2	-10	45.5	-0.1303	0.5304	+0.1428	+28	-38
299	6.3	2	00	19.45	13	16	27.7		4	47.4	- 9	12.2	-1.2125	0.5309	0.1413	-44	-77
325	7.4	2	10	26.23	13	43	17.8		9	55.6	- 4	13.3	-0.9934	0.5325	0.1363	-23	-77
340	7.1	2	16	35.50	12	47	53.3		13	02.2	- 1	12.4	+0.4467	0.5336	0.1331	+64	- 5
374	6.1	2	30	36.26	14	50	56.3		20	04.2	+ 5	36.8	-0.9087	0.5359	0.1255	-18	-76
380	7.4	2	33	43.93	+13	34	18.5		21	37.9	+ 7	07.6	+0.6951	0.5364	+0.1237	+90	+10
391	7.4	2	36	41.59	14	40	44.8		23	06.3	+ 8	33.3	-0.3453	0.5369	0.1220	+16	-48
403	5.8	2	42	14.23	15	08	03.5	24	1	51.5	+11	13.4	-0.5154	0.5379	0.1188	+ 7	-60
413	6.8	2	45	40.38	15	19	58.1		3	33.6	-11	07.7	-0.5336	0.5385	0.1168	+ 6	-61
422	5.5	2	49	10.64	14	54	33.2		5	17.4	- 9	27.1	+0.1334	0.5391	0.1147	+43	-20
434	6.9	2	55	08.40	+16	07	30.7		8	13.5	- 6	36.5	-0.8737	0.5401	+0.1110	-15	-74
445	7.3	2	58	34.39	14	51	55.5		9	54.6	- 4	58.5	+0.6976	0.5407	0.1089	+90	+12
450	6.6	3	02	20.69	15	41	36.3		11	45.3	- 3	11.3	-0.0142	0.5414	0.1066	+35	-27
466	7.3	3	10	04.04	16	21	31.6		15	31.2	+ 0	27.5	-0.3532	0.5427	0.1016	+16	-47
469	7.3	3	11	48.13	15	26	01.1		16	21.7	+ 1	16.5	+0.7478	0.5431	0.1005	+90	+16
505	7.0	3	27	20.67	+16	37	03.7		23	52.1	+ 8	32.5	+0.1643	0.5458	+0.0902	+45	-15
510	7.2	3	28	58.27	17	47	41.6	25	0	38.9	+ 9	17.9	-1.0547	0.5461	0.0891	-30	-73
517	6.4	3	31	45.18	17	41	43.1		1	59.0	+10	35.3	-0.8278	0.5466	0.0871	-13	-73
527	6.3	3	37	03.61	16	24	00.5		4	31.2	-10	57.4	+0.8058	0.5476	0.0835	+90	+21
532	7.2	3	40	14.49	17	09	32.1		6	02.2	- 9	29.3	+0.1009	0.5481	0.0813	+41	-18
577	6.0	3	50	46.39	+17	12	07.5		11	02.0	- 4	39.2	+0.4410	0.5499	+0.0739	+64	+ 1
590	6.3	3	58	13.42	17	10	41.5		14	32.8	- 1	15.3	+0.7164	0.5512	0.0685	+90	+17
593	5.8	3	58	24.10	18	04	32.5		14	37.8	- 1	10.4	-0.2558	0.5512	0.0683	+21	-37
600	6.8	4	02	15.87	17	24	08.6		16	26.7	+ 0	34.9	+0.5989	0.5519	0.0655	+79	+11
610	6.2	4	05	35.67	17	13	39.5		18	00.3	+ 2	05.5	+0.8889	0.5524	0.0631	+90	+29
617	6.6	4	08	17.11	+18	18	49.1		19	15.9	+ 3	18.5	-0.2145	0.5529	+0.0611	+23	-34
620	6.3	4	10	07.41	17	10	09.8		20	07.4	+ 4	08.4	+1.0815	0.5532	0.0597	+90	+44
629	7.5	4	15	36.59	18	09	13.8		22	40.8	+ 6	36.7	+0.1585	0.5541	0.0556	+45	-12
639	6.0	4	17	59.29	18	38	31.4		23	47.1	+ 7	40.8	-0.3111	0.5545	0.0538	+18	-39
643	6.7	4	19	06.75	+18	19	04.4	26	0	18.5	+ 8	11.1	+0.0686	0.5547	+0.0529	+39	-17

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

MARCH

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
648	3.9	4 20	31.39		+17 26	38.3		26	0 57.7		+ 8 49.1		+1.0512	0.5549	+0.0519	+90	+42
654	6.0	4 22	30.89		18 56	43.6			1 53.1		+ 9 42.7		-0.5306	0.5553	0.0504	+ 5	-54
658	4.2	4 23	04.23		17 49	55.2			2 08.6		+ 9 57.6		+0.6900	0.5553	0.0499	+90	+18
663	6.9	4 24	39.66		18 06	45.9			2 52.7		+10 40.3		+0.4217	0.5556	0.0488	+63	+ 3
668	3.6	4 26	10.52		19 05	14.6			3 34.7		+11 20.9		-0.6011	0.5558	0.0476	+ 1	-60
684	6.2	4 31	07.76		+17 55	40.9			5 51.9		-10 26.5		+0.7592	0.5566	+0.0438	+90	+23
691	6.6	4 33	15.52		19 47	43.1			6 50.8		- 9 29.6		-1.2198	0.5569	0.0422	-50	-71
697	7.2-7.4	4 34	49.06		18 27	27.5			7 33.8		- 8 48.0		+0.2576	0.5572	0.0410	+51	- 5
710	7.1	4 40	25.32		18 38	29.5			10 08.2		- 6 18.9		+0.1583	0.5580	0.0366	+45	-10
718	6.1	4 43	50.43		18 39	31.4			11 42.1		- 4 48.1		+0.1949	0.5585	0.0340	+47	- 8
726	6.8	4 46	15.39		+18 38	21.9			12 48.4		- 3 44.1		+0.2520	0.5589	+0.0320	+51	- 5
730	5.1	4 48	55.85		18 46	05.6			14 01.6		- 2 33.3		+0.1508	0.5593	0.0300	+44	-10
736	6.2	4 52	31.05		19 25	02.1			15 39.7		- 0 58.6		-0.5023	0.5599	0.0271	+ 7	-50
760	6.5	5 03	04.44		19 44	55.2			20 27.2		+ 3 39.2		-0.7476	0.5614	0.0188	- 8	-71
764	5.0	5 04	58.97		18 35	18.5			21 19.0		+ 4 29.3		-0.5153	0.5616	0.0173	+71	+11
769	6.6	5 06	22.64		+19 48	18.4			21 56.8		+ 5 05.8		-0.7816	0.5617	+0.0161	-10	-71
787	7.5	5 14	17.44		18 23	31.5		27	1 31.0		+ 8 32.6		+0.7816	0.5629	0.0098	+90	+27
790	6.9	5 15	03.01		20 05	11.4			1 51.5		+ 8 52.4		-1.0324	0.5630	0.0092	-29	-70
793	6.2	5 16	46.58		20 05	25.2			2 38.1		+ 9 37.4		-1.0295	0.5632	0.0078	-29	-70
796	6.8	5 17	50.61		19 32	05.5			3 06.8		+10 05.2		-0.4304	0.5633	0.0069	+11	-43
798	6.4	5 18	28.70		+19 46	16.5			3 23.9		+10 21.7		-0.6817	0.5634	+0.0064	- 4	-65
800	7.5	5 19	12.97		18 51	53.1			3 43.8		+10 40.9		+0.2916	0.5635	+0.0058	+54	0
823	6.6	5 26	52.75		18 19	51.7			7 09.9		-10 00.1		+0.8712	0.5645	-0.0004	+90	+34
829	7.0	5 29	12.84		18 12	44.1			8 12.6		- 8 59.6		+0.9964	0.5648	0.0023	+90	+43
832	4.7	5 29	46.06		18 33	45.6			8 27.4		- 8 45.3		+0.6211	0.5649	0.0027	+82	+19
836	5.5	5 31	04.98		+18 30	35.4			9 02.6		- 8 11.3		+0.6755	0.5650	-0.0038	+90	+22
862	7.5	5 40	01.62		18 57	59.7			13 01.8		- 4 20.4		+0.1577	0.5661	0.0110	+45	- 8
863	6.7	5 40	26.54		18 57	34.4			13 12.9		- 4 09.7		+0.1632	0.5661	0.0113	+45	- 7
871	6.9	5 42	44.66		18 41	08.6			14 14.3		- 3 10.4		+0.4422	0.5664	0.0132	+65	+ 8
886	7.0	5 48	37.88		18 32	18.8			16 51.1		- 0 39.1		+0.5574	0.5670	0.0180	+75	+13
888	6.0	5 49	55.33		+19 51	23.6			17 25.4		- 0 06.0		-0.8549	0.5672	-0.0190	-15	-71
895	5.9	5 52	28.71		19 44	27.4			18 33.3		+ 0 59.6		-0.7542	0.5675	0.0211	- 9	-71
904	7.1	5 56	27.74		18 48	55.3			20 19.0		+ 2 41.6		+0.1891	0.5679	0.0244	+47	- 7
913	5.2	6 00	59.45		19 41	26.4			22 19.0		+ 4 37.3		-0.7916	0.5684	0.0280	-11	-71
934	6.4	6 08	35.61		18 08	16.1		28	1 39.9		+ 7 51.2		+0.7492	0.5691	0.0342	+90	+23
940	5.7	6 09	33.38		+19 47	57.3			2 05.4		+ 8 15.8		-1.0235	0.5692	-0.0350	-28	-71
943	6.2	6 11	06.48		18 41	25.9			2 46.3		+ 8 55.2		+0.1252	0.5694	0.0363	+43	-12
944	5.7	6 12	02.73		17 55	02.3			3 11.0		+ 9 19.1		+0.9277	0.5695	0.0370	+90	+34
947	5.2	6 12	23.92		19 10	11.6			3 20.3		+ 9 28.1		-0.4025	0.5695	0.0373	+13	-43
951	6.8	6 13	15.05		18 18	34.8			3 42.8		+ 9 49.8		+0.4928	0.5696	0.0380	+69	+ 8
970	6.5	6 19	00.24		+17 46	54.8			6 14.3		-11 44.1		+0.9473	0.5701	-0.0426	+90	+35
975	6.8	6 20	24.22		17 35	36.3			6 51.1		-11 08.6		+1.1193	0.5702	0.0438	+90	+49
985	6.9	6 23	43.92		18 46	52.8			8 18.6		- 9 44.2		-0.1995	0.5705	0.0465	+24	-31
1003	7.2	6 29	52.89		17 48	46.2			10 59.9		- 7 08.5		+0.6885	0.5710	0.0514	+90	+18
1006	6.9	6 32	12.01		19 27	37.4			12 00.7		- 6 09.9		-1.0976	0.5712	0.0533	-35	-71
1011	7.4	6 33	28.47		+17 43	30.0			12 34.1		- 5 37.7		+0.6973	0.5713	-0.0543	+90	+18
1029	5.1	6 39	59.04		17 41	06.6			15 24.4		- 2 53.4		+0.5765	0.5718	0.0595	+77	+11
1038	6.8	6 43	54.66		18 52	50.6			17 07.1		- 1 14.4		-0.7818	0.5721	0.0626	-10	-72
1040	6.2	6 44	57.70		18 14	15.5			17 34.5		- 0 48.0		-0.1365	0.5722	0.0635	+28	-29
1057	6.9	6 53	51.56		17 47	24.9			21 26.6		+ 2 55.9		+0.0729	0.5729	0.0705	+40	-18
1072	6.2	7 00	00.53		+17 48	49.9		29	0 06.7		+ 5 30.3		-0.1462	0.5732	-0.0753	+27	-31
1073	6.0	7 00	09.48		16 43	59.3			0 10.6		+ 5 34.0		+0.9768	0.5733	0.0754	+90	+34
1091	6.7	7 09	22.92		17 02	39.4			4 10.3		+ 9 25.2		+0.3351	0.5738	0.0825	+56	- 5
1096	5.3	7 10	59.20		16 13	42.6			4 52.0		+10 05.4		+1.1260	0.5740	0.0838	+90	+46
1104	6.8	7 14	21.65		+16 13	08.6			6 19.6		+11 29.8		+1.0106	0.5742	-0.0864	+90	+36

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

MARCH-APRIL

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m			°	°
1106	3.6	7 15	42.43		+16 36	51.9		29	6 54.5	-11 56.5	+0.5488	0.5743	-0.0875	+74	+ 6	
1116	7.4	7 20	41.67		17 29	17.7			9 03.8	-9 51.9	-0.5510	0.5745	0.0912	+ 4	-59	
1141	5.6	7 29	24.83		17 10	24.4			12 49.6	- 6 14.2	-0.5790	0.5750	0.0978	+ 3	-62	
1145	6.7	7 31	02.73		15 43	37.6			13 31.8	- 5 33.5	+0.8483	0.5750	0.0990	+90	+23	
1147	5.1	7 31	14.39		15 54	54.4			13 36.8	- 5 28.6	+0.6456	0.5751	0.0991	+84	+11	
1176	7.4	7 43	47.02		+16 32	18.0			19 01.0	- 0 16.1	-0.5588	0.5756	-0.1083	+ 4	-61	
1183	7.2	7 48	11.11		14 56	43.3			20 54.6	+ 1 33.4	+0.8738	0.5758	0.1115	+90	+23	
1190	7.1	7 51	36.08		16 08	35.2			22 22.8	+ 2 58.4	-0.5245	0.5760	0.1140	+ 6	-59	
1197	6.0	7 54	38.23		15 54	01.0			23 41.1	+ 4 13.9	-0.4245	0.5761	0.1161	+12	-52	
1212	7.1	8 00	22.35		15 03	49.3		30	2 08.9	+ 6 36.4	+0.1436	0.5763	0.1201	+44	-19	
1231	6.3	8 06	23.50		+13 45	38.4			4 43.9	+ 9 05.8	+1.1623	0.5766	-0.1243	+90	+45	
1234	6.1	8 08	39.25		14 45	05.0			5 42.2	+10 02.0	+0.0262	0.5766	0.1258	+37	-26	
1237	6.4	8 10	03.09		14 07	37.8			6 18.2	+10 36.7	+0.5891	0.5767	0.1268	+77	+ 5	
1256	7.1	8 19	34.94		13 45	18.1			10 23.4	- 9 27.0	+0.4367	0.5770	0.1332	+64	- 5	
1257	7.5	8 19	37.89		14 53	56.1			10 24.6	- 9 25.8	-0.7332	0.5770	0.1332	- 6	-76	
1265	5.8	8 24	26.54		+12 47	25.2			12 28.3	- 7 26.6	+1.1387	0.5772	-0.1363	+90	+42	
1271	5.9	8 26	18.71		14 20	50.2			13 16.4	- 6 40.3	-0.5571	0.5772	0.1375	+ 4	-64	
1281	6.4	8 31	27.45		13 23	53.2			15 28.6	- 4 32.8	+0.1025	0.5775	0.1408	+41	-23	
1309	5.7	8 40	55.55		12 49	42.7			19 31.7	- 0 38.5	+0.0983	0.5778	0.1467	+41	-24	
1318	5.7	8 44	39.94		12 15	39.6			21 07.7	+ 0 54.0	+0.4370	0.5779	0.1489	+63	- 6	
1320	6.8	8 46	23.04		+12 41	55.6			21 51.8	+ 1 36.5	-0.1164	0.5779	-0.1499	+29	-37	
1332	5.7	8 53	40.05		11 47	00.3		31	0 58.6	+ 4 36.5	+0.3361	0.5780	0.1542	+56	-12	
1341	4.3	8 56	13.52		12 01	01.9			2 04.2	+ 5 39.7	-0.0696	0.5782	0.1556	+32	-34	
1359	5.1	9 05	30.46		10 50	02.1			6 02.0	+ 9 29.0	+0.4963	0.5785	0.1608	+68	- 4	
1364	6.5	9 07	31.59		11 43	55.2			6 53.7	+10 18.8	-0.5474	0.5786	0.1619	+ 5	-66	
1381	6.3	9 15	36.84		+11 40	25.1			10 20.8	-10 21.7	-1.0531	0.5789	-0.1662	-28	-79	
1384	7.4	9 17	17.21		9 57	48.7			11 03.6	- 9 40.4	+0.5463	0.5789	0.1670	+72	- 2	
1397	5.5	9 26	14.66		9 14	09.7			14 52.8	- 5 59.6	+0.6286	0.5792	0.1714	+80	+ 2	
1410	5.3	9 29	44.72		9 53	50.5			16 22.3	- 4 33.3	-0.2910	0.5793	0.1731	+19	-50	
1428	3.8	9 38	56.79		10 04	46.7			20 17.4	- 0 46.8	-1.1582	0.5796	0.1773	-37	-80	
1429	6.8	9 39	02.55		+ 9 10	58.5			20 19.9	- 0 44.4	-0.2695	0.5796	-0.1773	+21	-49	
1440	6.7	9 45	05.07		8 45	39.4			22 54.1	+ 1 44.3	-0.3071	0.5798	0.1799	+19	-51	
1454	7.1	9 51	55.49		8 16	07.3		1	1 48.7	+ 4 32.5	-0.3433	0.5801	0.1826	+17	-54	
1457	6.7	9 53	44.13		7 52	20.4			2 34.9	+ 5 16.9	-0.0893	0.5802	0.1834	+30	-39	
1465	6.3	9 55	56.40		8 30	37.8			3 31.1	+ 6 11.1	-0.8965	0.5803	0.1842	-16	-82	
1468	4.9	9 58	01.93		+ 8 14	30.2			4 24.4	+ 7 02.5	-0.7928	0.5804	-0.1850	- 9	-82	
1482	6.3	10 04	37.94		5 48	43.5			7 12.6	+ 9 44.5	+1.1000	0.5807	0.1874	+90	+32	
1518	6.3	10 20	50.92		6 45	05.9			14 05.2	- 7 37.9	-1.1390	0.5815	0.1926	-34	-84	
1519	6.5	10 21	06.09		5 54	11.2			14 11.7	- 7 31.7	-0.3196	0.5815	0.1927	+18	-54	
1565	6.3	10 41	12.48		4 57	49.7			22 41.9	+ 0 39.9	-1.0502	0.5825	0.1977	-26	-86	
1611	5.7	11 04	48.09		+ 2 10	44.2		2	8 38.5	+10 14.5	-0.2931	0.5839	-0.2016	+19	-53	
1623	5.4	11 11	38.99		0 09	15.8			11 31.2	-10 59.3	+1.1141	0.5844	0.2022	+90	+32	
1635	5.4	11 15	10.13		2 14	12.7			12 59.8	- 9 33.9	-1.2290	0.5846	0.2025	-43	-88	
1637	6.0	11 16	48.01		1 52	33.8			13 40.8	- 8 54.4	-1.0133	0.5848	0.2027	-24	-89	
1649	6.3	11 21	11.33		0 21	28.1			15 31.2	- 7 08.1	+0.1031	0.5851	0.2029	+41	-30	
1652	5.5	11 21	55.44		+ 1 38	01.7			15 49.7	- 6 50.3	-1.2107	0.5851	-0.2029	-41	-89	
1685	4.5	11 34	50.36		- 0 35	47.5			21 13.9	- 1 38.1	-0.1215	0.5861	0.2032	+29	-42	
1971	5.8	13 43	44.52		12 13	12.3		5	2 09.3	+ 1 17.1	+1.1401	0.5964	0.1676	+78	+35	
2053	4.6	14 16	52.69		13 10	52.9			15 28.8	- 9 54.4	-0.0232	0.5982	0.1486	+28	-37	
2114	5.8	14 47	03.36		13 58	38.6		6	3 33.2	+ 1 41.8	-0.9150	0.5991	0.1286	-25	-90	
2117	5.3	14 48	24.26		-15 49	32.8			4 05.5	+ 2 12.9	+0.8471	0.5991	-0.1276	+75	+14	
2118	2.9	14 48	35.76		15 52	13.3			4 10.1	+ 2 17.3	+0.8815	0.5991	0.1275	+75	+16	
2159	5.3	15 04	19.43		16 05	48.5			10 26.8	+ 8 19.3	+0.3430	0.5992	0.1162	+46	-16	
2193	6.1	15 18	42.87		15 23	58.5			16 11.4	-10 09.5	-0.9883	0.5990	0.1053	-33	-90	
2209	5.9	15 25	55.66		-16 34	21.2			19 04.2	- 7 23.5	-0.1142	0.5989	-0.0998	+18	-42	

Full Moon—Apr. 4^d 03^h 45^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

APRIL

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels		
		h	m	s	°	'	"	d	h	m	h	m			°	'	
2213	5.9	15	28	20.63	-16	28	04.4	6	20	02.1	- 6	27.9	-0.3142	0.5988	-0.0979	+ 7	-55
2218	5.6	15	30	35.21	16	42	45.9		20	55.9	- 5	36.2	-0.1565	0.5987	0.0962	+16	-45
2271	4.3	15	51	28.35	16	36	29.7	7	5	17.0	+ 2	25.5	-0.9980	0.5977	0.0795	-36	-90
2316	6.4	16	07	32.41	18	13	52.1		11	43.8	+ 8	37.2	+0.1643	0.5966	0.0663	+31	-26
2331	6.4	16	12	16.09	18	25	46.4		13	37.9	+10	26.9	+0.2425	0.5962	0.0624	+35	-22
2361	4.8	16	24	37.60	-18	21	45.3		18	36.8	- 8	45.7	-0.1101	0.5950	-0.0521	+14	-42
2399	5.0	16	39	10.84	17	39	44.3	8	0	30.4	- 3	05.8	-1.0943	0.5933	0.0398	-47	-90
2401	5.6	16	39	27.76	19	50	42.3		0	37.2	- 2	59.1	+1.1221	0.5933	0.0396	+71	+37
2436	6.3	16	54	38.10	19	28	27.9		6	48.0	+ 2	57.5	+0.5428	0.5912	0.0268	+53	- 4
2441	6.5	16	57	19.73	18	11	03.8		7	54.1	+ 4	01.1	-0.8042	0.5908	0.0244	-28	-90
2448	6.4	16	59	25.97	-18	49	29.7		8	45.8	+ 4	50.8	-0.1696	0.5905	-0.0227	+ 8	-46
2508	6.3	17	22	11.57	18	24	27.7		18	08.5	-10	07.8	-0.7233	0.5868	-0.0035	-25	-90
2578	6.4	17	53	28.69	18	47	42.6	9	7	14.5	+ 2	29.1	-0.2012	0.5806	+0.0225	+ 6	-48
2629	6.3	18	08	47.34	19	51	01.3		13	45.4	+ 8	45.8	+1.0869	0.5772	0.0349	+71	+34
2640	6.1	18	13	04.63	18	40	28.2		15	35.7	+10	32.1	-0.0735	0.5762	0.0383	+15	-40
2647	6.4	18	15	02.60	-18	28	41.9		16	26.4	+11	21.0	-0.2457	0.5758	+0.0399	+ 6	-51
2653	6.4	18	16	17.17	18	38	08.0		16	58.5	+11	51.9	-0.0597	0.5755	0.0409	+16	-39
2658	5.4-6.2	18	18	56.63	18	52	43.3		18	07.2	-11	01.8	+0.2429	0.5749	0.0430	+34	-21
2674	6.0	18	25	31.24	17	49	32.7		20	57.9	- 8	17.3	-0.7315	0.5733	0.0481	-21	-90
2680	5.8	18	27	45.51	18	45	19.6		21	56.2	- 7	21.0	+0.2915	0.5727	0.0498	+37	-19
2686	5.2	18	29	00.42	-18	25	52.6		22	28.8	- 6	49.6	-0.0215	0.5724	+0.0508	+19	-37
2687	6.5-7.3	18	29	26.70	19	09	15.7		22	40.2	- 6	38.6	+0.7476	0.5723	0.0512	+71	+ 8
2715	6.5	18	40	28.45	19	19	26.6	10	3	29.6	- 1	59.5	+1.1965	0.5696	0.0596	+71	+46
2731	6.5	18	46	19.45	18	38	50.0		6	04.2	+ 0	29.7	+0.6436	0.5681	0.0640	+65	+ 1
2764	6.3	18	57	01.01	18	37	21.8		10	48.8	+ 5	04.4	+0.9427	0.5653	0.0720	+72	+21
2826	4.0	19	19	15.77	-17	55	31.9		20	50.1	- 9	14.9	+1.0094	0.5595	+0.0878	+73	+26
2827	4.6	19	19	20.84	16	01	59.9		20	52.4	- 9	12.7	-1.0027	0.5595	0.0878	-35	-90
2876	5.4	19	38	20.47	16	23	19.0	11	5	35.9	- 0	46.7	+0.1967	0.5544	0.1005	+37	-24
2880	5.1	19	40	08.42	16	13	17.8		6	26.0	+ 0	01.8	+0.1023	0.5539	0.1017	+31	-30
2883	5.5	19	41	11.26	15	33	59.7		6	55.2	+ 0	30.0	-0.5498	0.5536	0.1023	- 4	-74
2905	6.4	19	50	45.59	-14	42	35.2		11	23.5	+ 4	49.4	-0.9998	0.5511	+0.1084	-32	-90
2913	5.0	19	55	35.45	15	36	07.1		13	39.8	+ 7	01.2	+0.2083	0.5498	0.1114	+39	-24
2968	6.2	20	18	26.16	14	54	59.0	12	0	33.1	- 6	26.5	+0.7579	0.5439	0.1247	+76	+ 8
2969	3.2	20	18	40.34	14	54	46.8		0	39.9	- 6	19.9	+0.7684	0.5438	0.1248	+76	+ 8
3002	6.2	20	31	52.57	13	51	51.5		7	04.2	- 0	07.8	+0.4566	0.5405	0.1319	+57	-10
3045	6.0	20	48	23.95	-12	41	58.6		15	11.6	+ 7	44.5	+0.2978	0.5366	+0.1402	+47	-19
3054	6.4	20	50	48.81	11	43	53.5		16	23.5	+ 8	54.1	-0.5880	0.5360	0.1413	- 2	-76
3093	4.5	21	07	19.33	11	32	26.8	13	0	38.7	- 7	05.8	+0.4010	0.5324	0.1487	+55	-13
3104	6.5	21	12	01.36	10	46	40.5		3	01.0	- 4	47.8	-0.0781	0.5314	0.1507	+27	-40
3128	6.2	21	20	42.07	9	29	50.4		7	25.1	- 0	31.7	-0.8099	0.5297	0.1541	-13	-90
3133	5.8	21	22	58.50	- 9	55	35.1		8	34.6	+ 0	35.8	-0.1608	0.5292	+0.1550	+23	-45
3166	4.8	21	35	31.75	8	02	30.2		15	00.5	+ 6	50.1	-1.2186	0.5269	0.1596	-45	-90
3185	5.3	21	42	46.65	9	16	27.7		18	44.9	+10	27.9	+0.7374	0.5257	0.1620	+81	+ 6
3187	6.2	21	44	02.59	9	28	07.0		19	24.2	+11	06.0	+1.0575	0.5254	0.1624	+81	+28
3229	5.6	22	01	04.57	6	43	28.6	14	4	16.1	- 4	17.7	-0.5014	0.5228	0.1674	+ 6	-68
3272	5.8	22	14	55.56	- 5	35	45.6		11	32.5	+ 2	46.1	-0.5172	0.5211	+0.1709	+ 6	-69
3287	5.8	22	21	56.18	5	02	55.2		15	14.6	+ 6	21.8	-0.4872	0.5202	0.1724	+ 8	-67
3320	5.3	22	35	35.37	4	26	37.9		22	29.1	-10	36.2	+0.1011	0.5190	0.1749	+40	-30
3326	6.4	22	38	38.04	3	46	19.3	15	0	06.3	- 9	01.8	-0.3591	0.5187	0.1754	+15	-57
3370	6.2	22	56	06.11	2	37	08.6		9	25.8	+ 0	01.8	+0.0093	0.5176	0.1776	+36	-35
3371	6.4	22	56	14.31	- 1	38	03.3		9	30.2	+ 0	06.1	-1.0701	0.5176	+0.1776	-28	-90
3444	6.5	23	21	22.98	+ 0	03	40.9		22	59.4	-10	47.6	-0.5464	0.5169	0.1790	+ 5	-72
3455	6.4	23	25	06.00	0	53	32.5	16	0	59.2	- 8	51.2	-1.1121	0.5170	0.1791	-32	-90
3494	4.6	23	39	54.46	1	32	58.1		8	56.7	- 1	07.3	-0.4185	0.5171	0.1788	+13	-61
3507	6.4	23	46	40.57	+ 1	58	54.5		12	34.8	+ 2	24.7	-0.2498	0.5173	+0.1784	+22	-50

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

APRIL

Cat. No.	Mag.	Apparent Right Ascension	Apparent Declination	<i>T</i>	<i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h m s	° ' "	d h m	h m				°	°
3508	5.8	23 47 18.65	+ 0 50 36.5	16 12 55.2	+ 2 44.6	+1.0765	0.5173	+0.1784	+90	+29
3512	5.8	23 49 49.05	2 41 50.0	14 16.0	+ 4 03.0	-0.7444	0.5174	0.1782	- 6	-88
3515	6.2	23 50 55.89	1 51 27.4	14 51.9	+ 4 37.9	+0.2956	0.5175	0.1781	+53	-19
505	7.0	3 27 20.45	16 37 02.9	21 5 37.3	- 7 54.9	+0.1290	0.5484	0.0903	+43	-17
510	7.2	3 28 58.05	17 47 40.6	6 23.9	- 7 09.8	-1.0906	0.5487	0.0891	-33	-73
517	6.4	3 31 44.96	+17 41 42.2	7 43.6	- 5 52.7	-0.8641	0.5492	+0.0873	-15	-73
527	6.3	3 37 03.38	16 23 59.8	10 15.2	- 3 26.0	+0.7691	0.5501	0.0835	+90	+19
532	7.2	3 40 14.25	17 09 31.3	11 45.8	- 1 58.3	+0.0635	0.5505	0.0813	+39	-20
577	6.0	3 50 46.13	17 12 06.7	16 44.5	+ 2 50.7	+0.4023	0.5522	0.0738	+61	- 1
590	6.3	3 58 13.14	17 10 40.8	20 14.7	+ 6 14.1	+0.6771	0.5534	0.0684	+90	+15
593	5.8	3 58 23.82	+18 04 31.6	20 19.7	+ 6 18.9	-0.2962	0.5534	+0.0683	+19	-39
600	6.8	4 02 15.58	17 24 07.8	22 08.3	+ 8 04.0	+0.5591	0.5540	0.0655	+75	+ 9
610	6.2	4 05 35.38	17 13 38.7	23 41.8	+ 9 34.3	+0.8492	0.5545	0.0630	+90	+26
617	6.6	4 08 16.81	18 18 48.2	22 0 57.1	+10 47.2	-0.2561	0.5549	0.0610	+21	-36
620	6.3	4 10 07.11	17 10 09.1	1 48.6	+11 36.9	+1.0416	0.5552	0.0596	+90	+41
629	7.5	4 15 36.28	+18 09 12.9	4 21.7	- 9 55.0	+0.1166	0.5559	+0.0555	+42	-14
639	6.0	4 17 58.98	18 38 30.6	5 28.0	- 8 50.9	-0.3541	0.5563	0.0537	+15	-42
643	6.7	4 19 06.43	18 19 03.5	5 59.3	- 8 20.7	+0.0263	0.5565	0.0529	+37	-19
648	3.9	4 20 31.07	17 26 37.6	6 38.5	- 7 42.7	+1.0106	0.5566	0.0518	+90	+39
654	6.0	4 22 30.57	18 56 42.8	7 33.9	- 6 49.2	-0.5745	0.5569	0.0503	+ 3	-58
658	4.2	4 23 03.91	+17 49 54.5	7 49.3	- 6 34.3	+0.6484	0.5569	+0.0499	+86	+15
663	6.9	4 24 39.34	18 06 45.1	8 33.4	- 5 51.6	+0.3795	0.5572	0.0487	+60	+ 1
668	3.6	4 26 10.19	19 05 13.7	9 15.4	- 5 11.0	-0.6456	0.5574	0.0475	- 2	-64
684	6.2	4 31 07.42	17 55 40.2	11 32.6	- 2 58.5	+0.7174	0.5581	0.0437	+90	+20
697	7.2-7.4	4 34 48.72	18 27 26.7	13 14.5	- 1 20.0	+0.2143	0.5585	0.0409	+48	- 8
710	7.1	4 40 24.97	+18 38 28.7	15 49.0	+ 1 09.3	+0.1143	0.5592	+0.0365	+42	-13
718	6.1	4 43 50.07	18 39 30.7	17 23.0	+ 2 40.2	+0.1507	0.5596	0.0338	+44	-10
726	6.8	4 46 15.03	18 38 21.2	18 29.4	+ 3 44.3	+0.2079	0.5599	0.0319	+48	- 7
730	5.1	4 48 55.48	18 46 04.9	19 42.8	+ 4 55.3	+0.1061	0.5602	0.0298	+42	-12
736	6.2	4 52 30.68	19 25 01.3	21 21.0	+ 6 30.2	-0.5493	0.5606	0.0270	+ 4	-53
760	6.5	5 03 04.05	+19 44 54.5	23 2 09.4	+11 08.8	-0.7966	0.5617	+0.0186	-11	-71
764	5.0	5 04 58.58	18 35 18.0	3 01.4	+11 59.1	+0.4713	0.5619	0.0171	+67	+ 9
769	6.6	5 06 22.24	19 48 17.7	3 39.4	-11 24.3	-0.8311	0.5620	0.0160	-14	-71
787	7.5	5 14 17.04	18 23 31.0	7 14.5	- 7 56.5	+0.7386	0.5628	0.0097	+90	+25
790	6.9	5 15 02.61	20 05 10.8	7 35.1	- 7 36.6	-1.0838	0.5629	0.0091	-34	-70
793	6.2	5 16 46.17	+20 05 24.6	8 21.9	- 6 51.4	-1.0811	0.5630	+0.0077	-33	-70
796	6.8	5 17 50.20	19 32 04.9	8 50.8	- 6 23.4	-0.4792	0.5632	0.0068	+ 8	-46
798	6.4	5 18 28.29	19 46 15.9	9 08.0	- 6 06.8	-0.7318	0.5632	0.0063	- 7	-71
800	7.5	5 19 12.56	18 51 52.6	9 28.0	- 5 47.5	+0.2462	0.5633	+0.0057	+51	- 2
823	6.6	5 26 52.34	18 19 51.3	12 55.4	- 2 27.3	+0.8288	0.5639	-0.0005	+90	+31
829	7.0	5 29 12.42	+18 12 43.7	13 58.4	- 1 26.4	+0.9546	0.5641	-0.0023	+90	+40
832	4.7	5 29 45.64	18 33 45.3	14 13.4	- 1 11.9	+0.5773	0.5641	0.0027	+77	+16
836	5.5	5 31 04.56	18 30 35.1	14 48.9	- 0 37.7	+0.6320	0.5642	0.0038	+84	+19
862	7.5	5 40 01.18	18 57 59.3	18 49.9	+ 3 15.1	+0.1113	0.5649	0.0110	+42	-10
863	6.7	5 40 26.11	18 57 34.0	19 01.1	+ 3 25.9	+0.1168	0.5650	0.0114	+42	-10
871	6.9	5 42 44.22	+18 41 08.3	20 03.0	+ 4 25.7	+0.3975	0.5651	-0.0132	+61	+ 5
886	7.0	5 48 37.44	18 32 18.6	22 41.2	+ 6 58.4	+0.5135	0.5655	0.0180	+71	+11
888	6.0	5 49 54.88	19 51 23.2	23 15.8	+ 7 31.9	-0.9081	0.5656	0.0190	-19	-71
895	5.9	5 52 28.26	19 44 27.1	24 0 24.4	+ 8 38.1	-0.8069	0.5657	0.0211	-12	-71
904	7.1	5 56 27.29	18 48 55.0	2 11.2	+10 21.2	+0.1429	0.5660	0.0243	+44	-10
913	5.2	6 00 58.99	+19 41 26.2	4 12.5	-11 41.7	-0.8450	0.5662	-0.0279	-15	-71
934	6.4	6 08 35.15	18 08 16.0	7 35.9	- 8 25.4	+0.7074	0.5665	0.0341	+90	+21
940	5.7	6 09 32.92	19 47 57.2	8 01.6	- 8 00.5	-1.0791	0.5667	0.0348	-33	-71
943	6.2	6 11 06.02	18 41 25.9	8 43.1	- 7 20.5	+0.0786	0.5667	0.0361	+40	-14
944	5.7	6 12 02.27	+17 55 02.3	9 08.1	- 6 56.4	+0.8874	0.5668	-0.0368	+90	+32

New Moon—Apr. 19^d 03^h 23^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

APRIL

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination	T			H		Y	x'	y'	Limiting Parallels	
		h	m	s		d	h	m	h	m				°	°
947	5.2	6	12	23.46	+19 10 11.5	24	9	17.6	- 6	47.2	-0.4533	0.5668	-0.0371	+10	-47
951	6.8	6	13	14.59	18 18 34.7		9	40.3	- 6	25.3	+0.4491	0.5668	0.0378	+65	+ 5
970	6.5	6	18	59.77	17 46 54.8		12	13.9	- 3	57.1	+0.9078	0.5671	0.0424	+90	+33
975	6.8	6	20	23.75	17 35 36.3		12	51.2	- 3	21.0	+1.0813	0.5671	0.0435	+90	+46
985	6.9	6	23	43.45	18 46 52.8		14	19.9	- 1	55.4	-0.2487	0.5672	0.0462	+21	-34
1003	7.2	6	29	52.42	+17 48 46.3		17	03.8	+ 0	42.8	+0.6473	0.5675	-0.0510	+85	+15
1006	6.9	6	32	11.53	19 27 37.5		18	05.5	+ 1	42.3	-1.1550	0.5675	0.0529	-41	-71
1011	7.4	6	33	28.00	17 43 30.2		18	39.4	+ 2	15.1	+0.6564	0.5675	0.0538	+87	+16
1029	5.1	6	39	58.56	17 41 06.8		21	32.6	+ 5	02.2	+0.5350	0.5677	0.0590	+73	+ 8
1038	6.8	6	43	54.17	18 52 50.8		23	17.0	+ 6	43.0	-0.8365	0.5679	0.0621	-14	-72
1040	6.2	6	44	57.22	+18 14 15.7		23	44.9	+ 7	10.0	-0.1847	0.5679	-0.0629	+25	-32
1057	6.9	6	53	51.08	17 47 25.2	25	3	41.3	+10	58.1	+0.0271	0.5681	0.0698	+37	-21
1072	6.2	7	00	00.05	17 48 50.2		6	24.6	-10	24.3	-0.1941	0.5682	0.0745	+24	-34
1073	6.0	7	00	09.00	16 43 59.7		6	28.6	-10	20.5	+0.9410	0.5682	0.0746	+90	+32
1091	6.7	7	09	22.44	17 02 39.8		10	33.3	- 6	24.3	+0.2931	0.5683	0.0816	+53	- 7
1096	5.3	7	10	58.72	+16 13 43.0		11	15.9	- 5	43.2	+1.0931	0.5683	-0.0828	+90	+43
1104	6.8	7	14	21.17	16 13 09.1		12	45.4	- 4	16.9	+0.9768	0.5683	0.0854	+90	+33
1106	3.6	7	15	41.95	16 36 52.4		13	21.1	- 3	42.4	+0.5097	0.5684	0.0864	+70	+ 4
1116	7.4	7	20	41.18	17 29 18.3		15	33.3	- 1	34.8	-0.6028	0.5684	0.0901	+ 1	-63
1141	5.6	7	29	24.35	17 10 25.0		19	24.5	+ 2	08.3	-0.6309	0.5684	0.0965	0	-66
1145	6.7	7	31	02.25	+15 43 38.2		20	07.7	+ 2	50.0	+0.8145	0.5684	-0.0977	+90	+21
1147	5.1	7	31	13.91	15 54 55.0		20	12.9	+ 2	55.0	+0.6091	0.5684	0.0978	+80	+ 8
1176	7.4	7	43	46.54	16 32 18.8	26	1	45.3	+ 8	15.8	-0.6099	0.5684	0.1069	+ 1	-66
1183	7.2	7	48	10.64	14 56 44.1		3	42.0	+10	08.4	+0.8422	0.5684	0.1099	+90	+22
1190	7.1	7	51	35.60	16 08 36.0		5	12.5	+11	35.7	-0.5747	0.5684	0.1123	+ 3	-63
1197	6.0	7	54	37.75	+15 54 01.8		6	33.0	-11	06.6	-0.4732	0.5684	-0.1144	+ 9	-56
1212	7.1	8	00	21.89	15 03 50.2		9	05.0	- 8	40.0	+0.1033	0.5683	0.1183	+41	-21
1231	6.3	8	06	23.03	13 45 39.3		11	44.5	- 6	06.0	+1.1372	0.5684	0.1223	+90	+43
1234	6.1	8	08	38.78	14 45 05.9		12	44.4	- 5	08.2	-0.0150	0.5683	0.1238	+34	-28
1237	6.4	8	10	02.62	14 07 38.7		13	21.5	- 4	32.5	+0.5562	0.5683	0.1247	+74	+ 3
1256	7.1	8	19	34.48	+13 45 19.1		17	34.1	- 0	28.7	+0.4027	0.5683	-0.1309	+61	- 6
1257	7.5	8	19	37.43	14 53 57.1		17	35.4	- 0	27.4	-0.7847	0.5683	0.1309	- 9	-76
1265	5.8	8	24	26.09	12 47 26.2		19	42.9	+ 1	35.6	+1.1158	0.5683	0.1340	+90	+39
1271	5.9	8	26	18.26	14 20 51.3		20	32.4	+ 2	23.4	-0.6054	0.5683	0.1351	+ 2	-68
1281	6.4	8	31	27.00	13 23 54.3		22	48.8	+ 4	35.0	+0.0647	0.5683	0.1383	+39	-25
1309	5.7	8	40	55.11	+12 49 43.8	27	2	59.8	+ 8	37.2	+0.0615	0.5683	-0.1440	+39	-26
1318	5.7	8	44	39.50	12 15 40.7		4	38.9	+10	12.9	+0.4059	0.5683	0.1462	+61	- 8
1320	6.8	8	46	22.60	11 41 56.8		5	24.4	+10	56.9	-0.1560	0.5683	0.1472	+27	-39
1332	5.7	8	53	39.62	11 47 01.4		8	37.5	- 9	56.8	+0.3045	0.5683	0.1513	+54	-14
1341	4.3	8	56	13.10	12 01 03.1		9	45.3	- 8	51.4	-0.1073	0.5683	0.1527	+29	-37
1359	5.1	9	05	30.04	+10 50 03.2		13	51.3	- 4	54.0	+0.4688	0.5684	-0.1577	+66	- 6
1364	6.5	9	07	31.18	11 43 56.4		14	44.8	- 4	02.4	-0.5916	0.5684	0.1587	+ 3	-70
1381	6.3	9	15	36.44	11 40 26.3		18	19.1	- 0	35.6	-1.1047	0.5685	0.1629	-32	-79
1384	7.4	9	17	16.81	9 57 49.8		19	03.4	+ 0	07.2	+0.5212	0.5685	0.1637	+70	- 3
1397	5.5	9	26	14.27	9 14 10.8		23	00.6	+ 3	56.1	+0.6061	0.5687	0.1680	+78	+ 1
1410	5.3	9	29	44.34	+ 9 53 51.6	28	0	33.3	+ 5	25.5	-0.3283	0.5688	-0.1696	+17	-52
1428	3.8	9	38	56.42	10 04 48.0		4	36.8	+ 9	20.5	-1.2088	0.5690	0.1737	-42	-80
1429	6.8	9	39	02.18	9 10 59.7		4	39.4	+ 9	22.9	-0.3053	0.5690	0.1737	+19	-51
1440	6.7	9	45	04.70	8 45 40.6		7	19.2	+11	57.2	-0.3427	0.5692	0.1763	+17	-54
1454	7.1	9	51	55.14	8 16 08.5		10	20.0	- 9	08.4	-0.3785	0.5694	0.1790	+15	-56
1457	6.7	9	53	43.79	+ 7 52 21.6		11	07.9	- 8	22.2	-0.1201	0.5695	-0.1797	+29	-40
1465	6.3	9	55	56.05	8 30 39.0		12	06.1	- 7	26.0	-0.9404	0.5695	0.1805	-19	-82
1468	4.9	9	58	01.59	8 14 31.4		13	01.3	- 6	32.7	-0.8348	0.5697	0.1813	-12	-82
1478	7.2	10	02	53.27	8 11 27.0		15	09.7	- 4	28.9	-1.1715	0.5698	0.1830	-37	-82
1482	6.3	10	04	37.61	+ 5 48 44.5		15	55.6	- 3	44.6	+1.0904	0.5699	-0.1836	+90	+31

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

APRIL-MAY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>			<i>Y</i>			<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m						°	'	
1489	6.8	10	07	04.79	+	6	22 22.3	28	17	00.3	-	2 42.2	+0.3257	0.5700	-0.1845	+55	-16			
1518	6.3	10	20	50.61		6	45 07.0		23	02.9	+	3 07.7	-1.1831	0.5708	0.1888	-38	-84			
1519	6.5	10	21	05.78		5	54 12.3		23	09.5	+	3 14.1	-0.3503	0.5708	0.1888	+16	-55			
1528	6.6	10	24	00.46		4	08 29.9	29	0	26.1	+	4 28.0	+1.1797	0.5710	0.1897	+90	+39			
1546	7.2	10	30	09.68		4	51 24.2		3	07.9	+	7 04.0	-0.0530	0.5713	0.1913	+32	-38			
1564	6.6	10	40	29.47	+	3	47 53.7		7	38.9	+11	25.5	+0.1388	0.5721	-0.1937	+43	-27			
1565	6.3	10	41	12.22		4	57 50.7		7	57.6	+11	43.5	-1.0895	0.5721	0.1939	-30	-86			
1566	6.6	10	43	01.70		2	42 16.5		8	45.4	-11	30.4	+1.0191	0.5722	0.1942	+90	+25			
1577	7.1	10	48	48.88		3	48 32.1		11	16.9	-	9 04.3	-0.5783	0.5727	0.1954	+ 4	-74			
1611	5.7	11	04	47.87		2	10 45.0		18	14.1	-	2 21.9	-0.3169	0.5740	0.1978	+18	-54			
1623	5.4	11	11	38.78	+	0	09 16.3		21	12.3	+	0 29.9	+1.1118	0.5747	-0.1986	+90	+32			
1624	6.8	11	11	45.87		2	29 35.9		21	15.4	+	0 32.9	-1.2279	0.5747	0.1986	-43	-88			
1635	5.4	11	15	09.93		2	14 13.5		22	43.7	+	1 58.1	-1.2647	0.5751	0.1990	-48	-88			
1637	6.0	11	16	47.82		1	52 34.6		23	26.1	+	2 38.9	-1.0457	0.5752	0.1990	-26	-89			
1649	6.3	11	21	11.14		0	21 28.6	30	1	19.9	+	4 28.6	+0.0873	0.5757	0.1993	+40	-31			
1652	5.5	11	21	55.26	+	1	38 02.4		1	38.9	+	4 47.0	-1.2448	0.5757	-0.1994	-45	-89			
1685	4.5	11	34	50.20	-	0	35 47.0		7	12.7	+10	08.8	-0.1386	0.5772	0.1998	+28	-43			
1735	6.4	11	58	55.07		1	32 16.7		17	30.8	-	3 55.5	-1.2579	0.5801	0.1987	-47	-90			
1744	6.5	12	03	53.16		2	54 07.9		19	37.6	-	1 53.4	-0.3278	0.5808	0.1981	+17	-55			
1787	6.0	12	25	44.68		4	23 15.0	1	4	52.1	+	7 00.9	-0.6771	0.5837	0.1947	- 3	-86			
1798	6.3	12	29	31.58	-	4	49 31.7		6	27.5	+	8 32.7	-0.5538	0.5843	-0.1939	+ 4	-72			
1807	5.9	12	34	40.04		5	36 17.9		8	37.0	+10	37.4	-0.2022	0.5850	0.1927	+23	-47			
1836	6.3	12	45	25.67		6	04 35.4		13	06.8	-	9 02.8	-0.5980	0.5866	0.1899	+ 1	-77			
1886	5.7	13	06	23.62		8	45 50.5		21	48.8	-	0 40.4	+0.4241	0.5895	0.1831	+59	-12			
1887	6.4	13	07	05.31		9	19 07.9		22	06.0	-	0 23.8	+0.9176	0.5897	0.1829	+81	+17			
1945	5.4	13	30	47.95	-	9	57 10.8	2	7	50.0	+	8 58.1	-0.1931	0.5931	-0.1732	+21	-47			
1971	5.8	13	43	44.70		12	13 13.3		13	06.2	-	9 57.8	+1.1415	0.5948	0.1670	+78	+35			
2092	7.2	14	38	17.05		13	52 11.3	3	11	00.3	+11	05.4	-0.5579	0.6010	0.1350	- 3	-74			
2105	6.6	14	43	41.58		15	17 10.1		13	09.3	-10	50.7	+0.5546	0.6014	0.1314	+63	- 4			
2114	5.8	14	47	03.71		13	58 39.4		14	29.5	-	9 33.6	-0.9126	0.6017	0.1291	-25	-90			
2117	5.3	14	48	24.62	-15	49	33.9		15	01.6	-	9 02.8	+0.8456	0.6018	-0.1281	+75	+13			
2118	2.9	14	48	36.11		15	52 14.4		15	06.2	-	8 58.4	+0.8799	0.6018	0.1280	+75	+16			
2271	4.3	15	51	28.87		16	36 30.3	4	15	54.7	-	9 08.7	-0.9900	0.6040	0.0803	-35	-90			
2316	6.4	16	07	32.97		18	13 52.8		22	14.3	-	3 04.1	+0.1637	0.6036	0.0671	+31	-26			
2331	6.4	16	12	16.66		18	25 47.0	5	0	06.1	-	1 16.7	+0.2412	0.6034	0.0632	+35	-22			
2361	4.8	16	24	38.20	-18	21	45.7		4	58.8	+	3 24.4	-0.1087	0.6026	-0.0528	+14	-42			
2399	5.0	16	39	11.46		17	39 44.5		10	44.4	+	8 56.4	-1.0835	0.6016	0.0405	-46	-90			
2401	5.6	16	39	28.40		19	50 42.7		10	51.1	+	9 02.8	+1.1110	0.6015	0.0402	+71	+36			
2436	6.3	16	54	38.76		19	28 28.0		16	52.9	-	9 09.6	+0.5365	0.5998	0.0272	+52	- 5			
2441	6.5	16	57	20.39		18	11 03.7		17	57.3	-	8 07.6	-0.7962	0.5996	0.0249	-27	-90			
2448	6.4	16	59	26.64	-18	49	29.6		18	47.7	-	7 19.2	-0.1685	0.5994	-0.0231	+ 8	-46			
2508	6.3	17	22	12.28		18	24 27.3	6	3	55.6	+	1 27.4	-0.7166	0.5960	-0.0036	-24	-90			
2578	6.4	17	53	29.44		18	47 41.7		16	39.6	-10	17.7	-0.2021	0.5902	+0.0227	+ 6	-48			
2629	6.3	18	08	48.12		19	51 00.3		22	59.3	-	4 12.4	+1.0685	0.5868	0.0354	+71	+32			
2640	6.1	18	13	05.41		18	40 27.0	7	0	46.4	-	2 29.3	-0.0773	0.5858	0.0388	+15	-40			
2647	6.4	18	15	03.38	-18	28	40.7		1	35.6	-	1 41.9	-0.2474	0.5853	+0.0404	+ 6	-51			
2653	6.4	18	16	17.95		18	38 06.8		2	06.8	-	1 11.9	-0.0638	0.5850	0.0414	+16	-39			
2658	5.4-6.2	18	18	57.42		18	52 42.0		3	13.5	-	0 07.6	+0.2346	0.5844	0.0435	+33	-22			
2674	6.0	18	25	32.03		17	49 31.2		5	59.2	+	2 32.0	-0.7276	0.5828	0.0488	-21	-90			
2680	5.8	18	27	46.30		18	45 18.1		6	55.8	+	3 26.5	+0.2819	0.5822	0.0505	+37	-19			
2686	5.2	18	29	01.22	-18	25	51.1		7	27.5	+	3 57.0	-0.0270	0.5819	+0.0515	+19	-37			
2687	6.5-7.3	18	29	27.50		19	09 14.3		7	38.6	+	4 07.7	+0.7320	0.5818	0.0519	+71	+ 7			
2715	6.5	18	40	29.26		19	19 25.0		12	19.5	+	8 38.4	+1.1741	0.5789	0.0604	+71	+43			
2731	6.5	18	46	20.26		18	38 48.2		14	49.6	+11	03.1	+0.6280	0.5773	0.0649	+63	0			
2733	6.4	18	47	09.66	-19	11	18.6		15	10.8	+11	23.5	+1.2156	0.5771	+0.0655	+71	+49			

Full Moon—May 3^d 12^h 23^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

MAY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>			<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		<i>h</i>	<i>m</i>	<i>s</i>	<i>°</i>	<i>'</i>	<i>"</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>	<i>°</i>				<i>'</i>	
2764	6.3	18	57	01.83	-18	37	19.9	7	19	26.1	- 8	30.4	+0.9225	0.5744	+0.0729	+72	+20	
2826	4.0	19	19	16.60	17	55	29.6	8	5	10.5	+ 0	53.4	+0.9867	0.5679	0.0889	+73	+24	
2827	4.6	19	19	21.66	16	01	57.4		5	12.8	+ 0	55.5	-0.9997	0.5679	0.0889	-35	-90	
2876	5.4	19	38	21.30	16	23	16.3		13	42.2	+ 9	07.4	+0.1828	0.5622	0.1017	+36	-25	
2880	5.1	19	40	09.25	16	13	15.0		14	31.0	+ 9	54.5	+0.0894	0.5618	0.1029	+31	-30	
2883	5.5	19	41	12.09	-15	33	56.9		14	59.4	+10	22.0	-0.5547	0.5614	+0.1036	- 5	-74	
2905	6.4	19	50	46.41	14	42	32.3		19	20.8	- 9	25.6	-1.0047	0.5585	0.1097	-33	-90	
2913	5.0	19	55	36.28	15	36	04.2		21	33.7	- 7	17.1	+0.1928	0.5571	0.1127	+38	-24	
2968	6.2	20	18	26.99	14	54	55.7	9	8	11.5	+ 2	59.6	+0.7344	0.5502	0.1259	+76	+ 6	
2969	3.2	20	18	41.16	14	54	43.5		8	18.2	+ 3	06.1	+0.7448	0.5501	0.1261	+76	+ 7	
3002	6.2	20	31	53.39	-13	51	48.0		14	34.0	+ 9	09.7	+0.4356	0.5462	+0.1331	+56	-11	
3045	6.0	20	48	24.76	12	41	54.9		22	31.7	- 7	07.8	+0.2773	0.5416	0.1413	+46	-20	
3054	6.4	20	50	49.61	11	43	49.8		23	42.2	- 5	59.6	-0.6000	0.5409	0.1424	- 3	-78	
3093	4.5	21	07	20.13	11	32	23.0	10	7	48.7	+ 1	51.8	+0.3782	0.5365	0.1497	+54	-14	
3104	6.5	21	12	02.15	10	46	36.6		10	08.6	+ 4	07.4	-0.0969	0.5353	0.1516	+26	-41	
3128	6.2	21	20	42.85	- 9	29	46.5		14	28.6	+ 8	19.4	-0.8232	0.5332	+0.1550	-14	-90	
3133	5.8	21	22	59.28	9	55	31.2		15	37.1	+ 9	25.8	-0.1797	0.5325	0.1558	+22	-46	
3166	4.8	21	35	32.52	8	02	26.2		21	57.6	- 8	25.2	-1.2303	0.5296	0.1603	-47	-90	
3185	5.3	21	42	47.41	9	16	23.6	11	1	39.2	- 4	50.2	+0.7104	0.5281	0.1627	+81	+ 4	
3187	6.2	21	44	03.35	9	28	02.9		2	18.0	- 4	12.6	+1.0281	0.5278	0.1631	+81	+25	
3229	5.6	22	01	05.30	- 6	43	24.5		11	04.2	+ 4	18.1	-0.5206	0.5245	+0.1679	+ 5	-70	
3272	5.8	22	14	56.28	5	35	41.5		18	16.8	+11	18.0	-0.5373	0.5221	0.1712	+ 5	-71	
3287	5.8	22	21	56.89	5	02	51.2		21	57.2	- 9	08.0	-0.5077	0.5211	0.1726	+ 7	-68	
3320	5.3	22	35	36.07	4	26	33.8	12	5	09.0	- 2	08.7	+0.0772	0.5193	0.1750	+39	-31	
3326	6.4	22	38	38.73	3	46	15.3		6	45.7	- 0	34.8	-0.3809	0.5190	0.1755	+14	-59	
3370	6.2	22	56	06.78	- 2	37	04.7		16	02.8	+ 8	26.4	-0.0142	0.5173	+0.1775	+34	-36	
3371	6.4	22	56	14.97	- 1	37	59.5		16	07.2	+ 8	30.6	-1.0892	0.5173	0.1775	-30	-90	
3444	6.5	23	21	23.60	+ 0	03	44.5	13	5	34.4	- 2	25.1	-0.5674	0.5160	0.1788	+ 4	-74	
3455	6.4	23	25	06.62	0	53	36.0		7	34.0	- 0	28.9	-1.1312	0.5160	0.1788	-33	-90	
3494	4.6	23	39	55.05	1	33	01.5		15	31.1	+ 7	14.7	-0.4391	0.5159	0.1785	+11	-63	
3507	6.4	23	46	41.15	+ 1	58	57.9		19	09.1	+10	46.6	-0.2704	0.5161	+0.1781	+21	-51	
3508	5.8	23	47	19.23	0	50	40.0		19	29.6	+11	06.5	+1.0526	0.5161	0.1781	+90	+27	
3512	5.8	23	49	49.62	2	41	53.3		20	50.3	-11	35.1	-0.7636	0.5161	0.1779	- 7	-88	
3515	6.2	23	50	56.46	1	51	30.8		21	26.2	-11	00.2	+0.2739	0.5162	0.1778	+52	-20	
98	6.2	0	45	13.84	6	30	45.4	15	2	24.7	- 6	51.3	+0.1558	0.5207	0.1688	+44	-25	
103	6.1	0	46	07.18	+ 7	04	17.6		2	52.9	- 6	23.9	-0.3847	0.5208	+0.1686	+14	-57	
105	4.6	0	46	30.76	7	21	26.8		3	05.4	- 6	11.8	-0.6667	0.5208	0.1686	- 1	-80	
146	4.4	1	00	46.31	7	39	53.6		10	36.1	+ 1	06.0	+0.2446	0.5227	0.1646	+50	-20	
272	5.9	1	48	38.60	10	50	09.4	16	11	23.1	+ 1	09.1	+0.6112	0.5310	0.1470	+79	+ 2	
290	6.1	1	57	11.28	12	05	29.8		15	43.7	+ 5	21.9	-0.1450	0.5327	0.1432	+27	-39	
299	6.3	2	00	19.75	+13	16	28.4		17	19.0	+ 6	54.4	-1.2235	0.5333	+0.1417	-45	-77	
823	6.6	5	26	52.19	18	19	51.2	20	18	40.2	+ 5	04.9	+0.8785	0.5679	+0.0002	+90	+35	
829	7.0	5	29	12.27	18	12	43.7		19	42.6	+ 6	05.2	+1.0046	0.5680	-0.0017	+90	+43	
832	4.7	5	29	45.49	18	33	45.1		19	57.4	+ 6	19.5	+0.6285	0.5681	0.0022	+83	+19	
836	5.5	5	31	04.40	18	30	35.0		20	32.5	+ 6	53.4	+0.6834	0.5682	0.0033	+90	+22	
862	7.5	5	40	01.01	+18	57	59.2	21	0	31.2	+10	43.8	+0.1664	0.5688	-0.0105	+45	- 7	
863	6.7	5	40	25.93	18	57	33.9		0	42.3	+10	54.5	+0.1719	0.5688	0.0109	+46	- 7	
871	6.9	5	42	44.04	18	41	08.2		1	43.7	+11	53.7	+0.4526	0.5689	0.0127	+66	+ 8	
886	7.0	5	48	37.25	18	32	18.5		4	20.4	- 9	35.0	+0.5700	0.5693	0.0175	+76	+14	
888	6.0	5	49	54.69	19	51	23.0		4	54.7	- 9	01.9	-0.8483	0.5694	0.0185	-15	-71	
895	5.9	5	52	28.06	+19	44	26.9		6	02.7	- 7	56.3	-0.7467	0.5695	-0.0206	- 8	-71	
904	7.1	5	56	27.08	18	48	55.0		7	48.6	- 6	14.1	+0.2021	0.5696	0.0239	+48	- 7	
913	5.2	6	00	58.78	19	41	26.0		9	48.9	- 4	18.0	-0.7829	0.5698	0.0276	-10	-71	
934	6.4	6	08	34.92	18	08	16.1		13	10.6	- 1	03.3	+0.7690	0.5700	0.0337	+90	+24	
940	5.7	6	09	32.69	+19	47	57.0		13	36.1	- 0	38.7	-1.0147	0.5700	-0.0345	-27	-71	

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

MAY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		<i>h</i>	<i>m</i>	<i>s</i>	<i>°</i>	<i>'</i>	<i>"</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>			<i>°</i>	<i>'</i>
943	6.2	6 11	05.79		+18 41	25.8		21	14	17.2	+ 0	01.0	+0.1417	0.5701	+44	-11
944	5.7	6 12	02.04		17 55	02.3			14	42.1	+ 0	25.0	+0.9497	0.5701	+90	+36
947	5.2	6 12	23.22		19 10	11.4			14	51.5	+ 0	34.0	-0.3891	0.5701	+13	-42
951	6.8	6 13	14.35		18 18	34.8			15	14.0	+ 0	55.8	+0.5123	0.5702	+71	+ 9
970	6.5	6 18	59.53		17 46	54.9			17	46.5	+ 3	22.9	+0.9720	0.5703	+90	+37
985	6.9	6 23	43.19		+18 46	52.8			19	51.7	+ 5	23.7	-0.1822	0.5703	+25	-30
1003	7.2	6 29	52.16		17 48	46.4			22	34.5	+ 8	00.8	+0.7148	0.5704	+90	+19
1006	6.9	6 32	11.27		19 27	37.5			23	35.8	+ 9	00.0	-1.0860	0.5704	-33	-71
1011	7.4	6 33	27.74		17 43	30.3		22	0	09.6	+ 9	32.6	+0.7249	0.5704	+90	+20
1029	5.1	6 39	58.29		17 41	07.0			3	01.8	-11	41.2	+0.6051	0.5704	+80	+12
1038	6.8	6 43	53.89		+18 52	50.9			4	45.7	-10	01.0	-0.7653	0.5704	- 9	-72
1040	6.2	6 44	56.93		18 14	15.9			5	13.5	- 9	34.2	-0.1133	0.5704	+29	-28
1057	6.9	6 53	50.78		17 47	25.4			9	08.9	- 5	47.0	+0.1006	0.5703	+41	-17
1072	6.2	6 59	59.75		17 48	50.5			11	51.6	- 3	10.0	-0.1193	0.5702	+29	-29
1073	6.0	7 00	08.70		16 44	00.1			11	55.6	- 3	06.2	+1.0168	0.5702	+90	+37
1091	6.7	7 09	22.12		+17 02	40.2			15	59.7	+ 0	49.4	+0.3705	0.5699	+59	- 3
1104	6.8	7 14	20.85		16 13	09.6			18	11.6	+ 2	56.7	+1.0564	0.5698	+90	+40
1106	3.6	7 15	41.62		16 36	52.9			18	47.2	+ 3	31.1	+0.5890	0.5698	+78	+ 9
1116	7.4	7 20	40.85		17 29	18.7			20	59.3	+ 5	38.6	-0.5246	0.5696	+ 6	-57
1141	5.6	7 29	24.01		17 10	25.5		23	0	50.5	+ 9	21.6	-0.5512	0.5692	+ 4	-60
1145	6.7	7 31	01.92		+15 43	38.8			1	33.8	+10	03.4	+0.8982	0.5692	+90	+27
1147	5.1	7 31	13.58		15 54	55.6			1	38.9	+10	08.4	+0.6924	0.5692	+90	+13
1176	7.4	7 43	46.19		16 32	19.4			7	12.0	- 8	30.2	-0.5277	0.5686	+ 6	-59
1183	7.2	7 48	10.29		14 56	44.8			9	08.9	- 6	37.3	+0.9303	0.5684	+90	+27
1190	7.1	7 51	35.25		16 08	36.7			10	39.8	- 5	09.7	-0.4912	0.5682	+ 8	-57
1197	6.0	7 54	37.40		+15 54	02.6			12	00.6	- 3	51.7	-0.3889	0.5680	+14	-50
1198	6.2	7 56	08.78		16 37	47.6			12	41.1	- 3	12.6	-1.2285	0.5680	-48	-74
1212	7.1	8 00	21.52		15 03	51.0			14	33.2	- 1	24.3	+0.1910	0.5678	+47	-16
1234	6.1	8 08	38.42		14 45	06.8			18	14.0	+ 2	08.7	+0.0736	0.5673	+40	-23
1237	6.4	8 10	02.26		14 07	39.6			18	51.2	+ 2	44.7	+0.6479	0.5672	+84	+ 8
1256	7.1	8 19	34.11		+13 45	20.1			23	05.7	+ 6	50.3	+0.4954	0.5667	+68	- 1
1257	7.5	8 19	37.06		14 53	58.0			23	07.0	+ 6	51.5	-0.6986	0.5667	- 4	-75
1265	5.8	8 24	25.72		12 47	27.2		24	1	15.5	+ 8	55.7	+1.2136	0.5665	+90	+50
1271	5.9	8 26	17.89		14 20	52.3			2	05.5	+ 9	43.9	-0.5176	0.5664	+ 6	-61
1281	6.4	8 31	26.63		13 23	55.3			4	23.2	+11	56.9	+0.1574	0.5661	+45	-20
1309	5.7	8 40	54.74		+12 49	44.9			8	36.9	- 7	58.3	+0.1555	0.5655	+44	-21
1318	5.7	8 44	39.12		12 15	41.8			10	17.2	- 6	21.4	+0.5029	0.5654	+69	- 2
1320	6.8	8 46	22.22		12 41	57.9			11	03.3	- 5	36.9	-0.0629	0.5653	+32	-33
1332	5.7	8 53	39.24		11 47	02.7			14	18.8	- 2	28.1	+0.4020	0.5649	+61	- 8
1341	4.3	8 56	12.71		12 01	04.3			15	27.6	- 1	21.8	-0.0128	0.5648	+35	-31
1359	5.1	9 05	29.66		+10 50	04.5			19	37.2	+ 2	39.3	+0.5692	0.5644	+74	0
1364	6.5	9 07	30.79		11 43	57.7			20	31.5	+ 3	31.7	-0.5003	0.5643	+ 8	-63
1381	6.3	9 15	36.05		11 40	27.7		25	0	09.3	+ 7	02.1	-1.0178	0.5639	-25	-79
1384	7.4	9 17	16.43		9 57	51.2			0	54.4	+ 7	45.6	+0.6234	0.5639	+80	+ 3
1397	5.5	9 26	13.89		9 14	12.2			4	56.0	+11	38.8	+0.7101	0.5636	+90	+ 7
1410	5.3	9 29	43.96		+ 9 53	53.1			6	30.4	-10	49.9	-0.2336	0.5635	+23	-46
1428	3.8	9 38	56.04		10 04	49.5			10	38.9	- 6	50.0	-1.1234	0.5632	-33	-80
1429	6.8	9 39	01.81		9 11	01.2			10	41.5	- 6	47.5	-0.2101	0.5632	+24	-45
1440	6.7	9 45	04.33		8 45	42.1			13	24.7	- 4	09.9	-0.2479	0.5631	+22	-47
1454	7.1	9 51	54.77		8 16	10.0			16	29.5	- 1	11.4	-0.2842	0.5630	+20	-50
1457	6.7	9 53	43.42		+ 7 52	23.1			17	18.5	- 0	24.1	-0.0228	0.5629	+34	-35
1465	6.3	9 55	55.68		8 30	40.5			18	18.0	+ 0	33.4	-0.8527	0.5629	-13	-82
1468	4.9	9 58	01.23		8 14	33.0			19	14.6	+ 1	28.0	-0.7460	0.5629	- 6	-82
1478	7.2	10 02	52.90		8 11	28.6			21	26.0	+ 3	34.9	-1.0870	0.5629	-30	-82
1482	6.3	10 04	37.25		+ 5 48	46.0			22	13.0	+ 4	20.3	+1.2024	0.5629	+90	+42

OCCULTATIONS, 1958
ELEMENTS FOR THE PREDICTION OF OCCULTATIONS
MAY-JUNE

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels			
		h	m	s	°	'	''	d	h	m	h	m				°	°		
1489	6.8	10	07	04.43	+	6	22	23.9	25	23	19.3	+	5	24.4	+0.4283	0.5629	-0.1822	+62	-10
1518	6.3	10	20	50.26		6	45	08.6	26	5	31.3	+	11	23.6	-1.1004	0.5630	0.1863	-31	-84
1519	6.5	10	21	05.43		5	54	13.9		5	38.2	+	11	30.3	-0.2568	0.5630	0.1864	+21	-49
1546	7.2	10	30	09.34		4	51	25.8		9	43.1	-	8	33.3	+0.0438	0.5632	0.1887	+38	-32
1564	6.6	10	40	29.13		3	47	55.3		14	21.8	-	4	04.1	+0.2374	0.5635	0.1910	+49	-22
1565	6.3	10	41	11.88	+	4	57	52.4		14	41.1	-	3	45.5	-1.0080	0.5636	-0.1912	-23	-86
1566	6.6	10	43	01.37		2	42	18.0		15	30.3	-	2	58.0	+1.1298	0.5636	0.1915	+90	+33
1577	7.1	10	48	48.56		3	48	33.7		18	06.3	-	0	27.4	-0.4907	0.5639	0.1926	+9	-67
1611	5.7	11	04	47.56		2	10	46.5	27	1	16.3	+	6	27.9	-0.2278	0.5647	0.1949	+23	-49
1623	5.4	11	11	38.48		0	09	17.7		4	20.1	+	9	25.3	+1.2211	0.5652	0.1956	+90	+42
1624	6.8	11	11	45.57	+	2	29	37.4		4	23.3	+	9	28.4	-1.1535	0.5652	-0.1957	-35	-88
1635	5.4	11	15	09.63		2	14	15.0		5	54.5	+	10	56.4	-1.1915	0.5655	0.1960	-39	-88
1637	6.0	11	16	47.52		1	52	36.1		6	38.2	+	11	38.6	-0.9695	0.5656	0.1961	-20	-89
1649	6.3	11	21	10.86		0	21	30.1		8	35.7	-	10	28.0	+0.1797	0.5660	0.1964	+46	-25
1652	5.5	11	21	54.97	+	1	38	04.0		8	55.3	-	10	09.0	-1.1727	0.5660	0.1964	-37	-89
1685	4.5	11	34	49.93	-	0	35	45.6		14	40.2	-	4	36.1	-0.0523	0.5672	-0.1967	+32	-38
1735	6.4	11	58	54.83		1	32	15.3	28	1	19.1	+	5	40.5	-1.1948	0.5698	0.1957	-40	-90
1744	6.5	12	03	52.93		2	54	06.6		3	30.2	+	7	47.0	-0.2515	0.5705	0.1952	+21	-50
1753	7.1	12	09	15.02		2	28	07.6		5	51.5	+	10	03.3	-1.1448	0.5711	0.1946	-35	-90
1754	6.9	12	09	15.03		3	32	55.8		5	51.5	+	10	03.3	-0.0612	0.5711	0.1946	+32	-39
1768	7.0	12	16	02.11	-	3	43	31.6		8	49.6	-	11	04.8	-0.4602	0.5721	-0.1936	+10	-65
1769	6.6	12	16	02.53		3	43	11.6		8	49.8	-	11	04.7	-0.4664	0.5721	0.1936	+9	-65
1779	6.7	12	21	08.00		4	44	44.3		11	03.1	-	8	56.1	+0.1325	0.5728	0.1928	+42	-28
1787	6.0	12	25	44.49		4	23	13.9		13	03.5	-	6	59.9	-0.6125	0.5734	0.1919	+1	-78
1792	7.1	12	27	54.74		5	47	40.9		14	00.2	-	6	05.3	+0.6161	0.5738	0.1915	+77	-2
1798	6.3	12	29	31.40	-	4	49	30.6		14	42.2	-	5	24.8	-0.4885	0.5740	-0.1912	+8	-67
1807	5.9	12	34	39.87		5	36	16.9		16	55.9	-	3	15.9	-0.1331	0.5747	0.1900	+27	-43
1817	6.9	12	37	23.14		5	52	26.3		18	06.6	-	2	07.7	-0.0871	0.5752	0.1894	+29	-40
1822	7.2	12	39	49.68		7	16	25.8		19	09.9	-	1	06.6	+1.1135	0.5755	0.1888	+83	+32
1836	6.3	12	45	25.52		6	04	34.5		21	34.8	+	1	13.0	-0.5384	0.5764	0.1874	+5	-71
1843	6.9	12	47	57.62	-	7	24	28.6		22	40.3	+	2	16.1	+0.5887	0.5768	-0.1867	+73	-3
1868	7.1	12	58	20.80		8	52	41.0	29	3	07.6	+	6	33.8	+1.2318	0.5785	0.1836	+82	+44
1886	5.7	13	06	23.51		8	45	49.8		6	33.7	+	9	52.4	+0.4912	0.5797	0.1809	+64	-8
1887	6.4	13	07	05.20		9	19	07.3		6	51.4	+	10	09.5	+0.9916	0.5799	0.1807	+81	+22
1890	7.4	13	07	37.67		7	26	08.5		7	05.2	+	10	22.8	-0.9296	0.5800	0.1805	-20	-90
1911	7.1	13	15	34.83	-	8	30	55.5		10	27.9	-	10	21.9	-0.4567	0.5813	-0.1776	+8	-65
1917	7.0	13	19	02.78		9	47	01.6		11	56.0	-	8	57.1	+0.5490	0.5819	0.1762	+68	-5
1945	5.4	13	30	47.90		9	57	10.3		16	53.3	-	4	10.7	-0.1440	0.5839	0.1714	+24	-44
1971	5.8	13	43	44.67		12	13	13.0		22	18.6	+	1	02.6	+1.2025	0.5861	0.1655	+78	+42
2053	4.6	14	16	53.01		13	10	53.7	30	12	01.1	-	9	45.8	+0.0082	0.5915	0.1478	+30	-35
2114	5.8	14	47	03.84	-	13	58	39.3	31	0	18.5	+	2	03.4	-0.9021	0.5958	-0.1289	-24	-90
2117	5.3	14	48	24.75		15	49	34.1		0	51.2	+	2	34.9	+0.8715	0.5960	0.1280	+75	+15
2118	2.9	14	48	36.25		15	52	14.6		0	55.9	+	2	39.4	+0.9061	0.5960	0.1279	+75	+17
2159	5.3	15	04	20.01		16	05	49.6		7	16.1	+	8	44.9	+0.3562	0.5979	0.1170	+47	-15
2193	6.1	15	18	43.51		15	23	59.1		13	02.2	-	9	42.5	-0.9853	0.5994	0.1065	-32	-90
2209	5.9	15	25	56.35	-	16	34	22.1		15	55.1	-	6	56.3	-0.1123	0.6001	-0.1011	+18	-42
2213	5.9	15	28	21.33		16	28	05.2		16	52.9	-	6	00.7	-0.3136	0.6002	0.0993	+7	-55
2218	5.6	15	30	35.92		16	42	46.7		17	46.6	-	5	09.2	-0.1568	0.6005	-0.0976	+16	-45
2578	6.4	17	53	30.04		18	47	40.6	3	2	43.8	+	1	34.6	-0.2696	0.5946	+0.0218	+3	-52
2629	6.3	18	08	48.75		19	50	59.1		8	58.7	+	7	35.2	+0.9884	0.5918	0.0345	+71	+25
2640	6.1	18	13	06.04	-	18	40	25.6		10	44.4	+	9	16.8	-0.1542	0.5910	+0.0380	+10	-45
2647	6.4	18	15	04.02		18	28	39.2		11	32.9	+	10	03.5	-0.3244	0.5906	0.0397	+1	-56
2653	6.4	18	16	18.60		18	38	05.3		12	03.6	+	10	33.0	-0.1423	0.5904	0.0407	+11	-44
2658	5.4-6.2	18	18	58.07		18	52	40.6		13	09.4	+	11	36.3	+0.1534	0.5899	0.0429	+28	-27
2674	6.0	18	25	32.69	-	17	49	29.6		15	52.6	-	9	46.6	-0.8067	0.5885	+0.0482	-25	-90

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JUNE

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>	<i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels				
		h	m	s	°	'	''						d	h	m	°	'
2680	5.8	18	27	46.97	-18	45	16.6	3	16	48.3	- 8	53.0	+0.1963	0.5880	+0.0500	+31	-24
2686	5.2	18	29	01.89	18	25	49.5		17	19.4	- 8	23.0	-0.1115	0.5877	0.0510	+14	-42
2687	6.5-7.3	18	29	28.17	19	09	12.7		17	30.3	- 8	12.5	+0.6430	0.5876	0.0513	+64	+ 1
2715	6.5	18	40	29.96	19	19	23.3		22	06.6	- 3	46.5	+1.0770	0.5851	0.0600	+71	+32
2731	6.5	18	46	20.96	18	38	46.3	4	0	34.1	- 1	24.4	+0.5314	0.5836	0.0646	+55	- 5
2733	6.4	18	47	10.37	-19	11	16.8		0	55.0	- 1	04.4	+1.1148	0.5834	+0.0653	+71	+36
2764	6.3	18	57	02.55	18	37	17.9		5	05.6	+ 2	57.1	+0.8187	0.5810	0.0728	+72	+12
2826	4.0	19	19	17.35	17	55	27.1		14	38.6	-11	50.6	+0.8718	0.5750	0.0891	+73	+16
2827	4.6	19	19	22.40	16	01	54.8		14	40.8	-11	48.5	-1.0994	0.5749	0.0892	-43	-90
2876	5.4	19	38	22.07	16	23	13.4		22	59.6	- 3	47.3	+0.0657	0.5695	0.1022	+29	-32
2880	5.1	19	40	10.02	-16	13	12.1		23	47.3	- 3	01.3	-0.0277	0.5689	+0.1034	+24	-37
2883	5.5	19	41	12.85	15	33	54.0	5	0	15.1	- 2	34.4	-0.6669	0.5686	0.1041	-11	-87
2905	6.4	19	50	47.19	14	42	29.1		4	30.8	+ 1	32.4	-1.1126	0.5658	0.1103	-42	-90
2913	5.0	19	55	37.07	15	36	01.0		6	40.8	+ 3	37.9	+0.0683	0.5644	0.1133	+30	-32
2968	6.2	20	18	27.80	14	54	52.2		17	04.5	-10	19.5	+0.5959	0.5574	0.1269	+67	- 2
2969	3.2	20	18	41.97	-14	54	40.0		17	11.0	-10	13.2	+0.6062	0.5573	+0.1270	+68	- 1
3002	6.2	20	31	54.20	13	51	44.2		23	18.6	- 4	17.9	+0.2946	0.5533	0.1342	+46	-19
3045	6.0	20	48	25.59	12	41	50.9	6	7	05.8	+ 3	14.1	+0.1319	0.5483	0.1425	+37	-28
3054	6.4	20	50	50.43	11	43	45.6		8	14.7	+ 4	20.8	-0.7384	0.5476	0.1437	-11	-90
3093	4.5	21	07	20.96	11	32	18.7		16	10.9	-11	58.2	+0.2259	0.5428	0.1510	+44	-23
3104	6.5	21	12	02.98	-10	46	32.2		18	28.0	- 9	45.5	-0.2465	0.5415	+0.1530	+18	-50
3128	6.2	21	20	43.68	9	29	42.0		22	42.7	- 5	38.7	-0.9690	0.5391	0.1563	-24	-90
3133	5.8	21	23	00.11	9	55	26.7		23	49.8	- 4	33.7	-0.3317	0.5384	0.1572	+14	-56
3185	5.3	21	42	48.24	9	16	18.9	7	9	40.5	+ 4	58.8	+0.5462	0.5333	0.1640	+68	- 5
3187	6.2	21	44	04.18	9	27	58.2		10	18.6	+ 5	35.8	+0.8611	0.5330	0.1644	+81	+13
3229	5.6	22	01	06.13	- 6	43	19.6		18	55.7	-10	02.7	-0.6787	0.5290	+0.1692	- 4	-86
3272	5.8	22	14	57.11	5	35	36.5	8	2	01.6	- 3	09.6	-0.6975	0.5261	0.1724	- 4	-89
3287	5.8	22	21	57.72	5	02	46.2		5	38.8	+ 0	21.2	-0.6691	0.5247	0.1738	- 3	-85
3320	5.3	22	35	36.89	4	26	28.8		12	44.8	+ 7	14.8	-0.0892	0.5224	0.1760	+30	-40
3326	6.4	22	38	39.55	3	46	10.2		14	20.3	+ 8	47.5	-0.5446	0.5219	0.1765	+ 5	-72
3370	6.2	22	56	07.59	- 2	36	59.6		23	31.2	- 6	17.6	-0.1804	0.5195	+0.1783	+25	-46
3371	6.4	22	56	15.79	- 1	37	54.5		23	35.6	- 6	13.3	-1.2493	0.5195	0.1784	-46	-90
3444	6.5	23	21	24.40	+ 0	03	49.6	9	12	56.0	+ 6	44.1	-0.7294	0.5172	0.1795	- 5	-90
3494	4.6	23	39	55.84	1	33	06.5		22	49.2	- 7	39.6	-0.5993	0.5164	0.1790	+ 3	-76
3507	6.4	23	46	41.93	1	59	02.8	10	2	26.3	- 4	08.6	-0.4300	0.5163	0.1786	+12	-62
3508	5.8	23	47	20.01	+ 0	50	45.0		2	46.7	- 3	48.8	+0.8882	0.5163	+0.1786	+90	+15
3512	5.8	23	49	50.40	2	41	58.2		4	07.1	- 2	30.7	-0.9208	0.5162	0.1783	-17	-88
3515	6.2	23	50	57.24	1	51	35.7		4	42.8	- 1	56.0	+0.1132	0.5163	0.1782	+42	-29
98	6.2	0	45	14.56	6	30	49.7	11	9	39.4	+ 2	11.0	+0.0133	0.5192	0.1692	+36	-33
103	6.1	0	46	07.91	7	04	21.9		10	07.6	+ 2	38.4	-0.5257	0.5193	0.1689	+ 7	-68
105	4.6	0	46	31.48	+ 7	21	31.0		10	20.1	+ 2	50.6	-0.8069	0.5194	+0.1688	-10	-83
146	4.4	1	00	47.01	7	39	57.7		17	51.4	+10	08.9	+0.1088	0.5211	0.1649	+42	-27
272	5.9	1	48	39.23	10	50	12.7	12	18	41.7	+10	15.4	+0.5000	0.5292	0.1476	+68	- 4
290	6.1	1	57	11.91	12	05	32.9		23	02.8	- 9	31.3	-0.2501	0.5309	0.1438	+22	-45
374	6.1	2	30	36.99	14	50	58.8	13	15	48.2	+ 6	43.4	-1.0051	0.5381	0.1271	-25	-76
403	5.8	2	42	14.89	+15	08	05.8		21	32.0	-11	43.5	-0.6064	0.5408	+0.1207	+ 1	-67
422	5.5	2	49	11.25	14	54	35.5	14	0	55.6	- 8	26.3	+0.0431	0.5424	0.1167	+38	-25
Venus	-3.5	2	52	28.29	14	19	50.2		2	31.5	- 6	53.4	+0.8639	0.4938	0.0990	+90	+22
517	6.4	3	31	45.52	17	41	43.7		21	19.9	+11	18.8	-0.8805	0.5521	0.0897	-16	-73
527	6.3	3	37	03.91	16	24	01.6		23	49.6	-10	16.4	+0.7467	0.5533	0.0861	+90	+18
577	6.0	3	50	46.60	+17	12	08.2	15	6	13.8	- 4	04.9	+0.3954	0.5562	+0.0764	+61	- 1
590	6.3	3	58	13.57	17	10	42.2		9	40.9	- 0	44.7	+0.6751	0.5578	0.0711	+89	+15
593	5.8	3	58	24.26	18	04	32.7		9	45.8	- 0	39.9	-0.2906	0.5578	+0.0709	+19	-39
1141	5.6	7	29	23.92	17	10	26.0	19	6	52.0	- 6	49.5	-0.4293	0.5751	-0.0958	+11	-51
1145	6.7	7	31	01.83	+15	43	39.5		7	34.5	- 6	08.4	+1.0121	0.5750	-0.0969	+90	+35

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JUNE

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
1147	5.1	7	31	13.49	+15	54	56.2	19	7	39.6	- 6	03.5	+0.8077	0.5750	-0.0971	+90	+21
1176	7.4	7	43	46.08	16	32	19.9		13	07.0	- 0	47.7	-0.3973	0.5744	0.1061	+13	-49
1183	7.2	7	48	10.17	14	56	45.6		15	02.1	+ 1	03.3	+1.0549	0.5741	0.1092	+90	+37
1190	7.1	7	51	35.12	16	08	37.3		16	31.5	+ 2	29.4	-0.3563	0.5739	0.1116	+15	-47
1197	6.0	7	54	37.26	15	54	03.2		17	50.9	+ 3	46.1	-0.2528	0.5737	0.1137	+21	-41
1198	6.2	7	56	08.64	+16	37	48.2		18	30.8	+ 4	24.6	-1.0869	0.5736	-0.1148	-32	-74
1210	5.9	7	59	07.56	16	34	10.0		19	49.0	+ 5	39.9	-1.1741	0.5734	0.1167	-41	-74
1212	7.1	8	00	21.38	15	03	51.8		20	21.2	+ 6	11.0	+0.3272	0.5734	0.1176	+56	- 9
1234	6.1	8	08	38.26	14	45	07.5		23	58.5	+ 9	40.6	+0.2153	0.5727	0.1231	+48	-16
1237	6.4	8	10	02.10	14	07	40.5	20	0	35.2	+10	16.1	+0.7874	0.5726	0.1240	+90	+17
1256	7.1	8	19	33.94	+13	45	21.0		4	45.8	- 9	42.2	+0.6413	0.5719	-0.1302	+83	+ 7
1257	7.5	8	19	36.89	14	53	58.8		4	47.1	- 9	40.9	-0.5468	0.5719	0.1302	+ 5	-63
1271	5.9	8	26	17.70	14	20	53.1		7	43.2	- 6	51.1	-0.3631	0.5714	0.1343	+15	-50
1281	6.4	8	31	26.44	13	23	56.3		9	58.9	- 4	40.1	+0.3116	0.5710	0.1375	+54	-12
1309	5.7	8	40	54.53	12	49	45.9		14	09.3	- 0	38.5	+0.3148	0.5702	0.1431	+55	-12
1318	5.7	8	44	38.92	+12	15	42.9		15	48.3	+ 0	57.0	+0.6628	0.5700	-0.1452	+85	+ 7
1320	6.8	8	46	22.01	12	41	59.0		16	33.8	+ 1	41.0	+0.1001	0.5698	0.1462	+41	-24
1332	5.7	8	53	39.02	11	47	03.8		19	47.1	+ 4	47.5	+0.5670	0.5692	0.1502	+75	+ 1
1341	4.3	8	56	12.49	12	01	05.4		20	55.0	+ 5	53.1	+0.1549	0.5690	0.1516	+44	-22
1344	6.8	8	57	09.46	13	14	06.9		21	20.3	+ 6	17.4	-1.1638	0.5689	0.1521	-38	-77
1359	5.1	9	05	29.43	+10	50	05.8	21	1	02.0	+ 9	51.4	+0.7397	0.5682	-0.1564	+90	+10
1364	6.5	9	07	30.56	11	43	58.9		1	55.8	+10	43.3	-0.3260	0.5681	0.1575	+17	-50
1381	6.3	9	15	35.81	11	40	28.9		5	31.6	- 9	48.4	-0.8389	0.5674	0.1615	-12	-79
1384	7.4	9	17	16.18	9	57	52.5		6	16.3	- 9	05.3	+0.7994	0.5672	0.1622	+90	+13
1397	5.5	9	26	13.64	9	14	13.6		10	15.9	- 5	13.9	+0.8900	0.5665	0.1664	+90	+18
1410	5.3	9	29	43.70	+ 9	53	54.5		11	49.6	- 3	43.4	-0.0507	0.5663	-0.1679	+33	-35
1428	3.8	9	38	55.77	10	04	50.9		15	56.5	+ 0	14.9	-0.9362	0.5656	0.1718	-18	-80
1429	6.8	9	39	01.54	9	11	02.6		15	59.1	+ 0	17.4	-0.0237	0.5656	0.1718	+34	-34
1440	6.7	9	45	04.06	8	45	43.6		18	41.4	+ 2	54.2	-0.0593	0.5652	0.1742	+32	-36
1454	7.1	9	51	54.50	8	16	11.6		21	45.5	+ 5	51.9	-0.0934	0.5648	0.1768	+30	-39
1457	6.7	9	53	43.14	+ 7	52	24.7		22	34.3	+ 6	39.0	+0.1686	0.5646	-0.1774	+45	-24
1458	5.9	9	54	13.64	9	07	45.9		22	48.0	+ 6	52.2	-1.1579	0.5646	-0.1776	-36	-81
1465	6.3	9	55	55.40	8	30	42.1		23	33.7	+ 7	36.4	-0.6608	0.5645	0.1782	- 1	-79
1468	4.9	9	58	00.94	8	14	34.5	22	0	30.1	+ 8	30.8	-0.5534	0.5644	0.1789	+ 5	-69
1478	7.2	10	02	52.62	8	11	30.2		2	41.2	+10	37.4	-0.8934	0.5641	0.1806	-15	-82
1489	6.8	10	07	04.15	+ 6	22	25.6		4	34.3	-11	33.3	+0.6241	0.5639	-0.1819	+79	0
1518	6.3	10	20	49.97	6	45	10.3		10	46.3	- 5	34.1	-0.9034	0.5632	0.1859	-16	-84
1519	6.5	10	21	05.14	5	54	15.6		10	53.1	- 5	27.5	-0.0583	0.5632	0.1860	+32	-38
1546	7.2	10	30	09.04	4	51	27.5		14	58.5	- 1	30.6	+0.2449	0.5629	0.1882	+50	-21
1564	6.6	10	40	28.83	3	47	57.1		19	38.3	+ 2	59.7	+0.4409	0.5627	0.1904	+63	-11
1565	6.3	10	41	11.58	+ 4	57	54.1		19	57.6	+ 3	18.3	-0.8084	0.5626	-0.1906	-10	-86
1577	7.1	10	48	48.26	3	48	35.5		23	23.8	+ 6	37.5	-0.2886	0.5625	0.1919	+20	-52
1599	5.0	10	58	25.06	3	50	23.2	23	3	44.4	+10	49.2	-1.1548	0.5624	0.1933	-35	-87
1611	5.7	11	04	47.25	2	10	48.3		6	37.0	-10	24.1	-0.0235	0.5625	0.1940	+34	-36
1624	6.8	11	11	45.27	2	29	39.3		9	45.8	- 7	21.8	-0.9541	0.5626	0.1946	-19	-88
1635	5.4	11	15	09.33	+ 2	14	16.9		11	17.9	- 5	52.8	-0.9925	0.5626	-0.1949	-22	-88
1637	6.0	11	16	47.22	1	52	38.0		12	02.1	- 5	10.1	-0.7694	0.5626	0.1950	- 7	-89
1649	6.3	11	21	10.56	0	21	31.9		14	00.9	- 3	15.4	+0.3865	0.5628	0.1952	+59	-14
1652	5.5	11	21	54.67	+ 1	38	05.8		14	20.8	- 2	56.2	-0.9741	0.5628	0.1953	-21	-89
1685	4.5	11	34	49.64	- 0	35	43.8		20	10.1	+ 2	41.2	+0.1524	0.5632	0.1955	+44	-27
1735	6.4	11	58	54.54	- 1	32	13.5	24	6	59.2	-10	52.0	-1.0027	0.5645	-0.1942	-23	-90
1744	6.5	12	03	52.65	2	54	04.9		9	12.7	- 8	43.1	-0.0525	0.5650	0.1937	+32	-38
1753	7.1	12	09	14.74	2	28	05.8		11	36.7	- 6	24.1	-0.9549	0.5653	0.1930	-20	-90
1754	6.9	12	09	14.75	3	32	54.0		11	36.7	- 6	24.1	+0.1383	0.5653	0.1930	+43	-28
1768	7.0	12	16	01.83	- 3	43	29.9		14	38.4	- 3	28.7	-0.2660	0.5660	-0.1920	+20	-51

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JUNE-JULY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
1769	6.6	12 16	02.25		- 3 43	09.8		24 14	38.6		- 3 28.5		-0.2722	0.5660	-0.1920	+20	-51
1779	6.7	12 21	07.72		4 44	42.6		16 54.7			- 1 17.1		+0.3310	0.5664	0.1912	+55	-17
1787	6.0	12 25	44.22		4 23	12.1		18 57.7			+ 0 41.6		-0.4226	0.5669	0.1903	+12	-62
1792	7.1	12 27	54.47		5 47	39.3		19 55.5			+ 1 37.5		+0.8176	0.5671	0.1899	+85	+10
1795	7.1	12 28	42.96		3 49	56.9		20 17.1			+ 1 58.2		-1.2344	0.5672	0.1897	-45	-90
1798	6.3	12 29	31.13		- 4 49	28.9		20 38.4			+ 2 18.9		-0.2985	0.5673	-0.1895	+18	-53
1807	5.9	12 34	39.60		5 36	15.2		22 55.2			+ 4 30.9		+0.0589	0.5679	0.1884	+38	-32
1817	6.9	12 37	22.88		5 52	24.7		25 0 07.5			+ 5 40.7		+0.1045	0.5681	0.1878	+40	-30
1836	6.3	12 45	25.26		6 04	32.9		3 40.7			+ 9 06.4		-0.3545	0.5691	0.1857	+15	-57
1843	6.9	12 47	57.37		7 24	27.1		4 47.8			+10 11.1		+0.7839	0.5693	0.1850	+83	+ 8
1886	5.7	13 06	23.28		- 8 45	48.4		12 53.2			- 6 00.5		+0.6784	0.5717	-0.1793	+80	+ 2
1887	6.4	13 07	04.97		9 19	06.0		13 11.5			- 5 42.9		+1.1843	0.5718	0.1790	+81	+39
1890	7.4	13 07	37.44		7 26	07.0		13 25.7			- 5 29.2		-0.7596	0.5719	0.1789	- 9	-90
1911	7.1	13 15	34.61		8 30	54.0		16 53.8			- 2 08.5		-0.2848	0.5730	0.1760	+17	-52
1917	7.0	13 19	02.56		9 47	00.3		18 24.2			- 0 41.3		+0.7314	0.5735	0.1747	+81	+ 5
1945	5.4	13 30	47.69		- 9 57	09.0		23 29.9			+ 4 13.4		+0.0242	0.5751	-0.1699	+34	-34
2000	7.1	13 56	14.26		11 51	23.4		26 10 25.5			- 9 14.6		+0.1521	0.5789	0.1580	+39	-27
2025	6.8	14 06	16.54		11 38	00.4		14 41.8			- 5 07.6		-0.7371	0.5805	0.1528	-11	-90
2034	7.2	14 10	56.12		13 39	59.4		16 40.4			- 3 13.3		+1.0155	0.5812	0.1502	+77	+25
2036	6.9	14 11	30.26		11 38	42.3		16 54.9			- 2 59.4		-1.0609	0.5813	0.1499	-33	-90
2053	4.6	14 16	52.87		-13 10	52.8		19 11.3			- 0 48.0		+0.1522	0.5821	-0.1469	+38	-27
2065	6.6	14 23	03.76		13 10	00.0		21 47.7			+ 1 42.7		-0.2409	0.5830	0.1434	+16	-50
2069	7.3	14 25	06.88		14 39	10.1		22 39.6			+ 2 32.6		+1.1361	0.5833	0.1421	+76	+36
2070	6.7	14 25	31.30		13 10	26.5		22 49.8			+ 2 42.5		-0.3810	0.5833	0.1418	+ 8	-59
2092	7.2	14 38	17.06		13 52	10.3		27 4 10.9			+ 7 51.7		-0.4175	0.5852	0.1341	+ 5	-62
2105	6.6	14 43	41.62		-15 17	09.5		6 26.4			+10 02.2		+0.7142	0.5860	-0.1306	+75	+ 5
2114	5.8	14 47	03.76		13 58	38.5		7 50.7			+11 23.3		-0.7895	0.5865	0.1285	-16	-90
2117	5.3	14 48	24.67		15 49	33.5		8 24.3			+11 55.7		+1.0061	0.5867	0.1276	+75	+25
2118	2.9	14 48	36.17		15 52	14.0		8 29.1			-11 59.7		+1.0410	0.5868	0.1275	+75	+28
2159	5.3	15 04	19.96		16 05	49.1		15 00.5			- 5 43.0		+0.4732	0.5888	0.1168	+56	- 9
2160	6.6	15 04	31.36		-16 19	29.3		15 05.2			- 5 38.5		+0.6943	0.5888	-0.1167	+73	+ 4
2170	6.8	15 09	32.10		16 00	12.3		17 09.4			- 3 39.0		+0.1316	0.5895	0.1132	+34	-28
2193	6.1	15 18	43.49		15 23	58.5		20 56.4			- 0 00.5		-0.8953	0.5905	0.1067	-26	-90
2209	5.9	15 25	56.35		16 34	21.6		23 54.1			+ 2 50.5		-0.0167	0.5914	0.1014	+24	-36
2210	6.8	15 26	20.34		15 33	29.4		28 0 03.9			+ 2 59.9		-1.0600	0.5914	0.1011	-39	-90
2211	7.2	15 27	15.27		-17 17	54.4		0 26.4			+ 3 21.6		+0.6634	0.5915	-0.1004	+69	+ 2
2213	5.9	15 28	21.33		16 28	04.7		0 53.5			+ 3 47.6		-0.2222	0.5916	0.0996	+13	-49
2218	5.6	15 30	35.93		16 42	46.2		1 48.6			+ 4 40.7		-0.0651	0.5919	0.0979	+21	-39
2232	7.2	15 36	21.29		17 31	46.5		4 09.9			+ 6 56.5		+0.5364	0.5924	0.0936	+58	- 5
2246	7.4	15 41	37.35		16 44	18.3		6 18.9			+ 9 00.7		-0.4619	0.5929	0.0896	- 1	-66
2259	6.7	15 47	31.35		-17 46	33.3		8 43.3			+11 19.5		+0.3793	0.5935	-0.0850	+46	-14
2271	4.3	15 51	29.22		16 36	29.5		10 20.1			-11 07.3		-0.9392	0.5938	0.0819	-31	-90
2316	6.4	16 07	33.41		18 13	52.4		16 51.8			+ 4 50.6		+0.2131	0.5949	0.0692	+34	-23
2331	6.4	16 12	17.12		18 25	46.7		18 46.9			- 3 00.0		+0.2857	0.5952	0.0654	+38	-19
2361	4.8	16 24	38.72		18 21	45.2		23 47.2			+ 1 48.8		-0.0845	0.5957	0.0553	+16	-40
2399	5.0	16 39	12.05		-17 39	43.5		29 5 40.6			+ 7 28.6		-1.0879	0.5960	-0.0432	-47	-90
2401	5.6	16 39	29.00		19 50	42.4		5 47.4			+ 7 35.2		+1.1298	0.5960	0.0430	+71	+38
2436	6.3	16 54	39.43		19 28	27.3		11 55.7			-10 30.7		+0.5288	0.5960	0.0301	+52	- 5
2441	6.5	16 57	21.06		18 11	02.6		13 01.1			- 9 27.8		-0.8190	0.5959	0.0279	-28	-90
2448	6.4	16 59	27.33		18 49	28.7		13 52.3			- 8 38.7		-0.1886	0.5958	0.0261	+ 7	-47
2508	6.3	17 22	13.07		-18 24	25.8		23 06.0			+ 0 13.9		-0.7685	0.5949	-0.0068	-27	-90
2876	5.4	19 38	22.65		16 23	11.1		2 8 12.7			+ 7 13.8		-0.0443	0.5721	+0.1008	+23	-38
2880	5.1	19 40	10.60		16 13	09.8		9 00.2			+ 7 59.6		-0.1392	0.5716	0.1020	+18	-44
2883	5.5	19 41	13.44		15 33	51.5		9 27.8			+ 8 26.3		-0.7791	0.5714	0.1028	-18	-90
2913	5.0	19 55	37.68		-15 35	58.4		15 51.0			- 9 23.9		-0.0566	0.5676	+0.1122	+23	-39

Full Moon—July 1^d 06^h 04^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JULY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
2968	6.2	20	18	28.45	-14	54	49.2	3	2	09.3	+ 0	33.2	+0.4503	0.5614	+0.1261	+56	-10
2969	3.2	20	18	42.62	14	54	37.1	2	15.7		+ 0	39.5	+0.4604	0.5613	0.1263	+56	-10
3002	6.2	20	31	54.87	13	51	41.0	8	19.4		+ 6	30.9	+0.1382	0.5576	0.1337	+37	-28
3045	6.0	20	48	26.28	12	41	47.3	16	01.1		-10	02.6	-0.0377	0.5530	0.1422	+28	-38
3054	6.4	20	50	51.13	11	43	42.0	17	09.2		- 8	56.8	-0.9070	0.5523	0.1433	-22	-90
3093	4.5	21	07	21.68	-11	32	14.8	4	0	59.2	- 1	22.0	+0.0408	0.5478	+0.1509	+33	-33
3104	6.5	21	12	03.70	10	46	28.2	3	14.4		+ 0	48.9	-0.4334	0.5464	0.1529	+ 8	-63
3128	6.2	21	20	44.41	9	29	37.8	7	25.7		+ 4	52.2	-1.1594	0.5440	0.1564	-40	-90
3133	5.8	21	23	00.85	9	55	22.5	8	31.9		+ 5	56.2	-0.5265	0.5435	0.1573	+ 3	-70
3185	5.3	21	42	49.00	9	16	14.5	18	14.1		- 8	39.7	+0.3334	0.5383	0.1643	+53	-17
3187	6.2	21	44	04.94	- 9	27	53.7	18	51.7		- 8	03.3	+0.6460	0.5380	+0.1647	+77	0
3229	5.6	22	01	06.91	6	43	14.8	5	3	21.4	+ 0	10.8	-0.8981	0.5339	0.1697	-18	-90
3272	5.8	22	14	57.90	5	35	31.6	10	21.3		+ 6	57.9	-0.9252	0.5308	0.1729	-19	-90
3287	5.8	22	21	58.51	5	02	41.2	13	55.5		+10	25.7	-0.9009	0.5294	0.1743	-17	-90
3320	5.3	22	35	37.69	4	26	23.7	20	55.8		- 6	46.4	-0.3309	0.5268	0.1767	+16	-55
3326	6.4	22	38	40.36	- 3	46	05.1	22	30.1		- 5	15.0	-0.7857	0.5262	+0.1771	- 9	-90
3370	6.2	22	56	08.41	- 2	36	54.3	6	7	34.3	+ 3	33.3	-0.4310	0.5233	0.1790	+12	-62
3444	6.5	23	21	25.23	+ 0	03	55.0	20	50.5		- 7	33.6	-0.9866	0.5202	0.1801	-22	-90
3494	4.6	23	39	56.67	1	33	11.9	7	6	38.7	+ 1	57.7	-0.8614	0.5187	0.1795	-13	-89
3507	6.4	23	46	42.77	1	59	08.3	10	14.3		+ 5	27.1	-0.6938	0.5183	0.1791	- 3	-87
3508	5.8	23	47	20.85	+ 0	50	50.4	10	34.5		+ 5	46.7	+0.6205	0.5183	+0.1790	+79	- 1
3512	5.8	23	49	51.24	2	42	03.6	11	54.4		+ 7	04.3	-1.1835	0.5181	0.1788	-38	-88
3515	6.2	23	50	53.07	1	51	41.2	12	29.9		+ 7	38.8	-0.1527	0.5181	0.1787	+27	-44
98	6.2	0	45	15.39	6	30	54.9	8	17	20.9	+11	40.2	-0.2498	0.5190	0.1694	+22	-49
103	6.1	0	46	08.74	7	04	27.0	17	49.1		-11	52.4	-0.7881	0.5190	0.1691	- 9	-83
105	4.6	0	46	32.32	+ 7	21	36.2	18	01.6		-11	40.3	-1.0689	0.5190	+0.1690	-28	-83
136	6.3	0	57	41.12	6	15	36.6	23	54.9		- 5	57.1	+1.1336	0.5201	0.1660	+90	+35
146	4.4	1	00	47.84	7	40	02.8	9	1	33.3	- 4	21.6	-0.1508	0.5202	0.1651	+27	-42
180	5.6	1	11	34.19	7	21	23.9	7	13.0		+ 1	08.3	+1.1180	0.5214	0.1618	+90	+35
181	6.5	1	11	35.68	7	21	34.0	7	13.7		+ 1	09.1	+1.1170	0.5214	0.1617	+90	+35
272	5.9	1	48	40.04	+10	50	17.3	10	2	29.0	- 4	09.6	+0.2594	0.5269	+0.1477	+51	-17
290	6.1	1	57	12.72	12	05	37.2	6	51.7		+ 0	05.2	-0.4866	0.5283	0.1440	+ 8	-61
374	6.1	2	30	37.77	14	51	02.6	23	43.9		- 7	33.2	-1.2225	0.5351	0.1276	-46	-76
403	5.8	2	42	15.66	15	08	09.4	11	5	30.3	- 1	57.5	-0.8157	0.5376	0.1212	-11	-75
422	5.5	2	49	12.01	14	54	39.0	8	55.4		+ 1	21.3	-0.1607	0.5392	0.1172	+26	-37
517	6.4	3	31	46.23	+17	41	46.3	12	5	28.6	- 2	44.7	-1.0527	0.5491	+0.0907	-30	-73
527	6.3	3	37	04.60	16	24	04.4	7	59.3		- 0	18.9	+0.5794	0.5504	0.0872	+77	+ 8
577	6.0	3	50	47.27	17	12	10.7	14	25.8		+ 5	54.9	+0.2391	0.5535	0.0777	+50	-10
590	6.3	3	58	14.24	17	10	44.6	17	54.1		+ 9	16.3	+0.5249	0.5552	0.0724	+72	+ 6
593	5.8	3	58	24.92	18	04	35.0	17	59.0		+ 9	21.1	-0.4406	0.5553	0.0723	+10	-49
610	6.2	4	05	36.43	+17	13	42.3	21	18.9		-11	25.7	+0.7087	0.5568	+0.0671	+90	+17
620	6.3	4	10	08.13	17	10	12.6	23	24.2		- 9	24.6	+0.9075	0.5578	0.0638	+90	+30
639	6.0	4	17	59.96	18	38	33.3	13	3	00.7	- 5	55.3	-0.4621	0.5596	0.0580	+ 9	-50
648	3.9	4	20	32.03	17	26	40.7	4	10.3		- 4	48.1	+0.8953	0.5600	0.0560	+90	+30
653	4.8	4	21	41.77	17	20	50.1	4	42.1		- 4	17.4	+1.0295	0.5603	0.0552	+90	+40
654	6.0	4	22	31.52	+18	56	45.2	5	04.8		- 3	55.4	-0.6721	0.5605	+0.0546	- 3	-67
658	4.2	4	23	04.85	17	49	57.4	5	20.0		- 3	40.7	+0.5409	0.5606	0.0542	+73	+ 9
668	3.6	4	26	11.12	19	05	16.0	6	44.8		- 2	18.8	-0.7357	0.5613	0.0518	- 7	-71
684	6.2	4	31	08.31	17	55	42.9	8	59.8		- 0	08.4	+0.6238	0.5623	0.0480	+82	+14
718	6.1	4	43	50.87	18	39	32.8	14	44.1		+ 5	24.1	+0.0859	0.5648	0.0382	+40	-14
730	5.1	4	48	56.26	+18	46	06.9	17	01.1		+ 7	36.5	+0.0512	0.5658	+0.0342	+38	-16
736	6.2	4	52	31.43	19	25	03.0	18	37.4		+ 9	09.5	-0.5909	0.5665	0.0314	+ 2	-57
760	6.5	5	03	04.73	19	44	55.8	23	19.7		-10	18.1	-0.8155	0.5683	0.0230	-12	-71
764	5.0	5	04	59.26	18	35	19.8	14	0	10.5	- 9	29.0	+0.4422	0.5687	0.0215	+65	+ 7
793	6.2	5	16	46.76	+20	05	25.6	5	23.5		- 4	27.0	-1.0706	0.5706	+0.0120	-32	-70

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JULY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
798	6.4	5	18	28.87	+19	46	16.9	14	6	08.5	-3	43.6	-0.7221	0.5709	+0.0106	-6	-70
832	4.7	5	29	46.14	18	33	46.7		11	06.0	+1	03.4	+0.5929	0.5726	0.0015	+79	+17
836	5.5	5	31	05.05	18	30	36.6		11	40.5	+1	36.8	+0.6494	0.5728	+0.0004	+86	+20
888	6.0	5	49	55.25	19	51	23.9		19	53.2	+9	32.0	-0.8365	0.5752	-0.0150	-14	-71
1397	5.5	9	26	13.56	9	14	14.8	18	16	51.8	+3	09.5	+1.0375	0.5743	0.1667	+90	+29
1410	5.3	9	29	43.62	+9	53	55.5		18	23.4	+4	37.9	+0.1089	0.5741	-0.1683	+42	-26
1428	3.8	9	38	55.67	10	04	51.9		22	24.4	+8	30.3	-0.7602	0.5734	0.1723	-7	-80
1429	6.8	9	39	01.44	9	11	03.8		22	26.9	+8	32.8	+0.1435	0.5733	0.1723	+44	-25
1440	6.7	9	45	03.95	8	45	44.8	19	1	05.5	+11	05.7	+0.1133	0.5729	0.1748	+42	-27
1454	7.1	9	51	54.37	8	16	12.8		4	05.3	-10	00.9	+0.0851	0.5724	0.1774	+40	-28
1457	6.7	9	53	43.01	+7	52	26.0		4	52.9	-9	14.9	+0.3460	0.5723	-0.1781	+56	-14
1458	5.9	9	54	13.51	9	07	47.1		5	06.3	-9	02.0	-0.9676	0.5722	0.1783	-21	-81
1465	6.3	9	55	55.27	8	30	43.3		5	50.9	-8	18.9	-0.4739	0.5720	0.1789	+9	-63
1468	4.9	9	58	00.81	8	14	35.8		6	46.0	-7	25.7	-0.3658	0.5720	0.1796	+15	-55
1478	7.2	10	02	52.48	8	11	31.4		8	54.1	-5	22.1	-0.6990	0.5716	0.1813	-3	-82
1489	6.8	10	07	04.00	+6	22	27.0		10	44.7	-3	35.4	+0.8078	0.5713	-0.1827	+90	+12
1518	6.3	10	20	49.80	6	45	11.7		16	48.5	+2	15.6	-0.6960	0.5704	0.1866	-3	-83
1519	6.5	10	21	04.97	5	54	17.0		16	55.2	+2	22.0	+0.1420	0.5704	0.1867	+43	-26
1546	7.2	10	30	08.85	4	51	29.1		20	55.3	+6	13.7	+0.4488	0.5698	0.1890	+64	-10
1564	6.6	10	40	28.63	3	47	58.7	20	1	29.4	+10	38.2	+0.6501	0.5693	0.1912	+82	+1
1565	6.3	10	41	11.38	+4	57	55.7		1	48.3	+10	56.5	-0.5886	0.5693	-0.1914	+3	-74
1577	7.1	10	48	48.05	3	48	37.1		5	10.5	-9	48.4	-0.0684	0.5690	0.1927	+32	-39
1599	5.0	10	58	24.83	3	50	24.8		9	26.2	-5	41.6	-0.9227	0.5685	0.1941	-17	-87
1611	5.7	11	04	47.02	2	10	50.1		12	15.7	-2	58.0	+0.2037	0.5683	0.1948	+47	-24
1624	6.8	11	11	45.03	2	29	41.0		15	21.3	+0	01.1	-0.7169	0.5681	0.1955	-4	-88
1635	5.4	11	15	09.09	+2	14	18.6		16	51.9	+1	28.6	-0.7535	0.5680	-0.1957	-7	-88
1637	6.0	11	16	46.98	1	52	39.7		17	35.3	+2	10.5	-0.5311	0.5680	0.1958	+6	-70
1649	6.3	11	21	10.31	0	21	33.8		19	32.3	+4	03.4	+0.6194	0.5679	0.1960	+79	-1
1652	5.5	11	21	54.42	+1	38	07.6		19	51.9	+4	22.3	-0.7324	0.5679	0.1960	-5	-89
1685	4.5	11	34	49.37	-0	35	41.9	21	1	36.1	+9	54.6	+0.3928	0.5678	0.1962	+60	-14
1708	6.2	11	46	54.30	-0	05	17.7		6	58.1	-8	54.6	-1.1702	0.5678	-0.1957	-37	-90
1735	6.4	11	58	54.26	1	32	11.6		12	17.7	-3	46.2	-0.7493	0.5680	0.1948	-7	-90
1744	6.5	12	03	52.36	2	54	02.9		14	29.9	-1	38.6	+0.1984	0.5681	0.1942	+47	-24
1753	7.1	12	09	14.45	2	28	03.9		16	52.7	+0	39.3	-0.6998	0.5682	0.1935	-4	-89
1754	6.9	12	09	14.45	3	32	52.1		16	52.7	+0	39.3	+0.3898	0.5682	0.1935	+59	-14
1768	7.0	12	16	01.54	-3	43	27.9		19	53.1	+3	33.3	-0.0119	0.5684	-0.1924	+34	-36
1769	6.6	12	16	01.96	3	43	07.9		19	53.2	+3	33.5	-0.0181	0.5684	0.1924	+34	-36
1779	6.7	12	21	07.43	4	44	40.6		22	08.4	+5	44.0	+0.5844	0.5686	0.1915	+74	-3
1787	6.0	12	25	43.92	4	23	10.2	22	0	10.7	+7	42.0	-0.1666	0.5688	0.1905	+25	-45
1792	7.1	12	27	54.16	5	47	37.3		1	08.3	+8	37.5	+1.0711	0.5689	0.1901	+85	+28
1795	7.1	12	28	42.66	-3	49	55.0		1	29.7	+8	58.2	-0.9764	0.5689	-0.1899	-22	-90
1798	6.3	12	29	30.83	4	49	27.0		1	51.0	+9	18.8	-0.0425	0.5689	0.1897	+32	-38
1807	5.9	12	34	39.30	5	36	13.3		4	07.2	+11	30.2	+0.3147	0.5692	0.1886	+53	-18
1817	6.9	12	37	22.57	5	52	22.7		5	19.3	-11	20.3	+0.3605	0.5693	0.1879	+56	-16
1836	6.3	12	45	24.95	6	04	30.9		8	51.9	-7	55.1	-0.0974	0.5699	0.1858	+29	-41
1843	6.9	12	47	57.06	-7	24	25.1		9	58.8	-6	50.5	+1.0401	0.5700	-0.1851	+83	+26
1865	7.2	12	56	51.63	5	52	01.2		13	53.8	-3	03.8	-1.2348	0.5706	0.1824	-46	-90
1886	5.7	13	06	22.96	8	45	46.6		18	04.4	+0	58.0	+0.9352	0.5713	0.1792	+82	+18
1890	7.4	13	07	37.13	7	26	05.2		18	36.9	+1	29.3	-0.5036	0.5714	0.1788	+6	-68
1911	7.1	13	15	34.29	8	30	52.2		22	05.6	+4	50.6	-0.0294	0.5720	0.1759	+31	-37
1917	7.0	13	19	02.25	-9	46	58.5		23	36.4	+6	18.2	+0.9876	0.5723	-0.1745	+81	+22
1945	5.4	13	30	47.38	9	57	07.3	23	4	43.5	+11	14.4	+0.2777	0.5733	0.1697	+49	-20
1973	6.2	13	45	02.33	9	30	08.0		10	54.4	-6	48.0	-1.2070	0.5746	0.1632	-45	-90
2000	7.1	13	56	13.96	11	51	21.9		15	44.4	-2	08.3	+0.4003	0.5757	0.1577	+55	-13
2013	7.5	14	01	14.95	-10	46	05.2		17	54.1	-0	03.3	-1.0401	0.5763	-0.1552	-31	-90

New Moon—July 16^d 18^h 33^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JULY

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>	<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		<i>h</i>	<i>m</i>	<i>s</i>	°	'	"		<i>h</i>	<i>m</i>				°	'
2025	6.8	14	06	16.24	-11	37	58.9	23 20 03.6	+ 2	01.5	-0.4958	0.5768	-0.1525	+ 3	-68
2036	6.9	14	11	29.97	11	38	40.8	22 18.2	+ 4	11.3	-0.8232	0.5774	0.1496	-16	-90
2053	4.6	14	16	52.58	13	10	51.4	24 0 36.4	+ 6	24.5	+0.3937	0.5779	0.1466	+53	-13
2065	6.6	14	23	03.47	13	09	58.6	3 15.0	+ 8	57.3	-0.0037	0.5785	0.1430	+29	-35
2070	6.7	14	25	31.02	13	10	25.1	4 17.9	+ 9	58.0	-0.1457	0.5788	0.1416	+21	-44
2092	7.2	14	38	16.78	-13	52	09.0	9 43.9	- 8	47.9	-0.1880	0.5802	-0.1338	+18	-46
2105	6.6	14	43	41.34	15	17	08.3	12 01.6	- 6	35.2	+0.9483	0.5807	0.1304	+75	+21
2114	5.8	14	47	03.49	13	58	37.2	13 27.3	- 5	12.7	-0.5667	0.5810	0.1283	- 3	-75
2117	5.3	14	48	24.40	15	49	32.4	14 01.6	- 4	39.7	+1.2401	0.5812	0.1274	+75	+49
2159	5.3	15	04	19.70	16	05	48.1	20 44.9	+ 1	48.8	+0.6959	0.5827	0.1168	+73	+ 4
2160	6.6	15	04	31.10	-16	19	28.2	20 49.7	+ 1	53.4	+0.9185	0.5827	-0.1167	+74	+19
2170	6.8	15	09	31.85	16	00	11.3	22 56.2	+ 3	55.3	+0.3490	0.5832	0.1132	+47	-16
2193	6.1	15	18	43.26	15	23	57.4	25 2 47.8	+ 7	38.3	-0.6911	0.5840	0.1068	-13	-90
2209	5.9	15	25	56.12	16	34	20.7	5 49.1	+10	32.9	+0.1903	0.5846	0.1016	+36	-25
2210	6.8	15	26	20.11	15	33	28.4	5 59.2	+10	42.6	-0.8618	0.5847	0.1013	-24	-90
2211	7.2	15	27	15.04	-17	17	53.5	6 22.2	+11	04.7	+0.8751	0.5847	-0.1006	+73	+16
2213	5.9	15	28	21.11	16	28	03.8	6 49.8	+11	31.4	-0.0183	0.5848	0.0998	+24	-36
2218	5.6	15	30	35.71	16	42	45.4	7 46.1	-11	34.5	+0.1387	0.5850	0.0982	+32	-27
2232	7.2	15	36	21.08	17	31	45.7	10 10.4	- 9	15.5	+0.7418	0.5854	0.0939	+73	+ 7
2246	7.4	15	41	37.14	16	44	17.5	12 22.2	- 7	08.6	-0.2684	0.5858	0.0900	+ 9	-52
2259	6.7	15	47	31.15	-17	46	32.6	14 49.7	- 4	46.6	+0.5764	0.5862	-0.0855	+61	- 3
2271	4.3	15	51	29.03	16	36	28.7	16 28.8	- 3	11.2	-0.7564	0.5865	0.0825	-19	-90
2301	6.8	16	02	40.82	18	25	33.4	21 08.0	+ 1	17.6	+0.7402	0.5871	0.0738	+72	+ 7
2313	7.0	16	05	45.04	18	07	52.0	22 24.5	+ 2	31.3	+0.3459	0.5873	0.0714	+43	-16
2316	6.4	16	07	33.24	18	13	51.8	23 09.5	+ 3	14.5	+0.3954	0.5874	0.0700	+46	-13
2331	6.4	16	12	16.96	-18	25	46.1	26 1 07.2	+ 5	07.8	+0.4653	0.5876	-0.0662	+50	- 9
2341	7.2	16	16	05.45	17	17	09.5	2 41.9	+ 6	39.0	-0.8092	0.5877	0.0632	-24	-90
2345	6.9	16	17	12.16	18	43	39.9	3 09.6	+ 7	05.6	+0.6403	0.5878	0.0623	+64	+ 1
2361	4.8	16	24	38.58	18	21	44.6	6 14.6	+10	03.7	+0.0829	0.5880	0.0563	+25	-31
2390	6.7	16	36	05.77	18	08	13.6	10 59.2	- 9	22.3	-0.3938	0.5882	0.0470	- 2	-61
2391	7.1	16	36	11.19	-18	44	33.3	11 01.5	- 9	20.2	+0.2267	0.5883	-0.0469	+33	-22
2396	6.6	16	38	55.78	17	58	43.4	12 09.6	- 8	14.6	-0.6106	0.5883	0.0447	-14	-81
2399	5.0	16	39	11.94	17	39	42.9	12 16.3	- 8	08.1	-0.9412	0.5883	0.0445	-35	-90
2408	6.9	16	43	06.18	19	03	37.7	13 53.3	- 6	34.8	+0.4274	0.5883	0.0413	+45	-11
2436	6.3	16	54	39.35	19	28	27.0	18 40.4	- 1	58.5	+0.6793	0.5883	0.0317	+66	+ 4
2441	6.5	16	57	20.98	-18	11	02.1	19 47.3	- 0	54.0	-0.6839	0.5883	-0.0295	-20	-90
2448	6.4	16	59	27.25	18	49	28.3	20 39.7	- 0	03.7	-0.0489	0.5883	0.0277	+15	-38
2463	6.9	17	07	50.20	19	22	59.6	0 08.1	+ 3	17.0	+0.4431	0.5881	0.0208	+45	-10
2497	6.6	17	18	09.84	19	17	21.1	4 25.3	+ 7	24.5	+0.2759	0.5878	0.0121	+33	-20
2508	6.3	17	22	13.05	18	24	25.3	6 06.3	+ 9	01.8	-0.6531	0.5876	-0.0088	-20	-87
2531	7.3	17	34	37.32	-18	57	53.3	11 16.0	-10	00.1	-0.0954	0.5870	+0.0016	+10	-41
2555	7.5	17	45	03.35	18	05	27.2	15 37.2	- 5	48.6	-0.9755	0.5862	0.0102	-41	-90
2571	6.9	17	49	23.22	19	30	45.4	17 25.9	- 4	04.0	+0.5202	0.5859	0.0139	+50	- 6
2573	7.3	17	49	54.56	19	06	36.0	17 39.0	- 3	51.4	+0.1058	0.5859	0.0143	+23	-29
2578	6.4	17	53	30.43	18	47	39.3	19 09.4	- 2	24.3	-0.1980	0.5856	0.0173	+ 6	-47
2629	6.3	18	08	49.22	-19	50	57.9	28 1 35.3	+ 3	47.3	+1.0506	0.5841	+0.0299	+71	+31
2640	6.1	18	13	06.52	18	40	24.0	3 23.8	+ 5	31.8	-0.1153	0.5836	0.0334	+12	-42
2647	6.4	18	15	04.51	18	28	37.5	4 13.6	+ 6	19.8	-0.2912	0.5833	0.0350	+ 3	-53
2653	6.4	18	16	19.09	18	38	03.6	4 45.1	+ 6	50.2	-0.1090	0.5832	0.0360	+13	-42
2658	5.4-6.2	18	18	58.58	18	52	39.0	5 52.5	+ 7	55.1	+0.1859	0.5828	0.0381	+30	-25
2674	6.0	18	25	33.22	-17	49	27.5	8 39.7	+10	36.2	-0.7981	0.5821	+0.0434	-25	-90
2680	5.8	18	27	47.52	18	45	14.8	9 36.8	+11	31.2	+0.2133	0.5818	0.0452	+32	-23
2686	5.2	18	29	02.44	18	25	47.6	10 08.6	-11	58.2	-0.1006	0.5816	0.0462	+14	-41
2687	6.5-7.3	18	29	28.72	19	09	11.0	10 19.8	-11	47.4	+0.6623	0.5815	0.0465	+65	+ 3
2715	6.5	18	40	30.56	-19	19	21.5	15 02.0	- 7	15.5	+1.0803	0.5800	+0.0553	+71	+33

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

JULY-AUGUST

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	''	d	h	m	h	m				°	'
2731	6.5	18	46	21.59	-18	38	44.3	28	17	32.3	- 4	50.6	+0.5176	0.5790	+0.0598	+54	- 6
2733	6.4	18	47	11.00	19	11	14.9		17	53.5	- 4	30.1	+1.1056	0.5789	0.0605	+71	+35
2764	6.3	18	57	03.23	18	37	15.6		22	08.4	- 0	24.4	+0.7873	0.5773	0.0681	+72	+10
2787	6.4	19	04	44.79	18	48	00.8	29	1	28.1	+ 2	48.2	+1.2125	0.5760	0.0738	+72	+48
2826	4.0	19	19	18.13	17	55	24.3		7	48.8	+ 8	55.3	+0.7971	0.5733	0.0846	+73	+11
2876	5.4	19	38	22.93	-16	23	09.8		16	13.6	- 6	57.6	-0.0516	0.5695	+0.0980	+22	-38
2880	5.1	19	40	10.88	16	13	08.4		17	01.5	- 6	11.3	-0.1490	0.5690	0.0992	+17	-44
2883	5.5	19	41	13.72	15	33	50.1		17	29.5	- 5	44.3	-0.7938	0.5688	0.0999	-19	-90
3133	5.8	21	23	01.35	9	55	19.5	31	16	44.8	- 8	03.1	-0.6492	0.5451	0.1556	- 4	-83
3185	5.3	21	42	49.54	9	16	11.3	1	2	25.5	+ 1	19.4	+0.1903	0.5406	0.1629	+43	-25
3187	6.2	21	44	05.48	- 9	27	50.5		3	02.9	+ 1	55.7	+0.5017	0.5403	+0.1634	+64	- 8
3229	5.6	22	01	07.47	6	43	11.2		11	30.4	+10	07.6	-1.0613	0.5366	0.1685	-30	-90
3272	5.8	22	14	58.48	5	35	27.7		18	27.9	- 7	07.6	-1.1024	0.5338	0.1720	-32	-90
3287	5.8	22	21	59.10	5	02	37.2		22	00.9	- 3	41.1	-1.0851	0.5324	0.1735	-31	-90
3320	5.3	22	35	38.31	4	26	19.5	2	4	58.5	+ 3	04.0	-0.5285	0.5299	0.1760	+ 6	-70
3326	6.4	22	38	40.98	- 3	46	00.8		6	32.1	+ 4	34.8	-0.9860	0.5294	+0.1764	-23	-90
3370	6.2	22	56	09.06	- 2	36	49.9		15	32.5	-10	40.8	-0.6474	0.5266	0.1786	- 1	-82
3444	6.5	23	21	25.92	+ 0	03	59.8	3	4	43.1	+ 2	06.7	-1.2234	0.5233	0.1798	-43	-90
3467	6.5	23	29	51.48	- 1	18	42.6		9	08.4	+ 6	24.3	+1.0845	0.5225	0.1797	+89	+29
3494	4.6	23	39	57.38	+ 1	33	16.8		14	27.3	+11	34.0	-1.1119	0.5216	0.1793	-32	-89
3507	6.4	23	46	43.49	+ 1	59	13.2		18	01.6	- 8	57.9	-0.9489	0.5211	+0.1789	-19	-89
3508	5.8	23	47	21.57	0	50	55.3		18	21.7	- 8	38.4	+0.3640	0.5211	0.1788	+57	-15
3515	6.2	23	50	58.80	1	51	46.1		20	16.4	- 6	47.0	-0.4109	0.5208	0.1785	+13	-61
98	6.2	0	45	16.18	6	31	00.0	5	1	00.7	- 2	52.3	-0.5339	0.5202	0.1691	+ 6	-69
103	6.1	0	46	09.53	7	04	32.2		1	28.9	- 2	24.9	-1.0727	0.5203	0.1689	-29	-83
104	5.8	0	46	13.72	+ 5	04	10.6		1	31.1	- 2	22.7	+1.1522	0.5203	+0.1689	+90	+37
136	6.3	0	57	41.92	6	15	41.6		7	34.4	+ 3	30.1	+0.8471	0.5208	0.1657	+90	+14
146	4.4	1	00	48.64	7	40	07.9		9	12.8	+ 5	05.6	-0.4390	0.5210	0.1648	+11	-61
180	5.6	1	11	34.99	7	21	28.9		14	52.7	+10	35.7	+0.8293	0.5217	0.1614	+90	+14
181	6.5	1	11	36.49	7	21	38.9		14	53.5	+10	36.5	+0.8284	0.5217	0.1614	+90	+13
272	5.9	1	48	40.87	+10	50	22.1	6	10	12.6	+ 5	21.7	-0.0319	0.5257	+0.1474	+33	-33
290	6.1	1	57	13.55	12	05	42.0		14	36.9	+ 9	38.2	-0.7791	0.5268	0.1436	- 9	-78
Mars	-0.2	2	34	52.18	12	38	01.3	7	9	44.9	+ 4	11.7	+1.2048	0.5098	0.1171	+90	+49
403	5.8	2	42	16.50	15	08	13.5		13	27.5	+ 7	47.4	-1.1005	0.5345	0.1209	-33	-75
422	5.5	2	49	12.85	14	54	43.0		16	54.9	+11	08.5	-0.4408	0.5358	0.1171	+11	-55
527	6.3	3	37	05.43	+16	24	07.7	8	16	17.0	+ 9	46.6	+0.3237	0.5457	+0.0873	+55	- 7
577	6.0	3	50	48.09	17	12	13.7		22	49.1	- 7	54.0	-0.0106	0.5487	0.0780	+35	-24
590	6.3	3	58	15.05	17	10	47.5	9	2	20.5	- 4	29.5	+0.2809	0.5503	0.0728	+53	- 7
593	5.8	3	58	25.74	18	04	37.8		2	25.5	- 4	24.6	-0.6891	0.5503	0.0727	- 4	-70
610	6.2	4	05	37.23	17	13	45.1		5	48.4	- 1	08.4	+0.4700	0.5518	0.0676	+67	+ 4
620	6.3	4	10	08.92	+17	10	15.3		7	55.5	+ 0	54.6	+0.6726	0.5527	+0.0643	+89	+15
639	6.0	4	18	00.75	18	38	35.8		11	35.4	+ 4	27.2	-0.6985	0.5545	0.0587	- 5	-70
648	3.9	4	20	32.81	17	26	43.3		12	45.9	+ 5	35.4	+0.6668	0.5550	0.0568	+88	+16
653	4.8	4	21	42.55	17	20	52.6		13	18.3	+ 6	06.7	+0.8024	0.5553	0.0559	+90	+24
654	6.0	4	22	32.32	18	56	47.6		13	41.3	+ 6	29.0	-0.9065	0.5555	0.0553	-19	-72
658	4.2	4	23	05.64	+17	49	59.9		13	56.7	+ 6	43.9	+0.3125	0.5556	+0.0549	+55	- 4
668	3.6	4	26	11.91	19	05	18.4		15	22.9	+ 8	07.1	-0.9680	0.5562	0.0526	-23	-71
684	6.2	4	31	09.08	17	55	45.3		17	39.9	+10	19.5	+0.4016	0.5572	0.0489	+61	+ 2
718	6.1	4	43	51.64	18	39	34.9		23	29.2	- 8	02.9	-0.1305	0.5598	0.0393	+28	-27
730	5.1	4	48	57.01	18	46	08.9	10	1	48.2	- 5	48.6	-0.1617	0.5608	0.0353	+26	-28
736	6.2	4	52	32.19	+19	25	04.9		3	25.9	- 4	14.2	-0.8039	0.5615	+0.0326	-12	-71
760	6.5	5	03	05.47	19	44	57.5		8	12.1	+ 0	22.2	-1.0214	0.5635	0.0243	-28	-71
764	5.0	5	04	59.99	18	35	21.6		9	03.6	+ 1	12.0	+0.2426	0.5639	0.0229	+50	- 4
798	6.4	5	18	29.58	19	46	18.4		15	06.3	+ 7	02.2	-0.9156	0.5663	0.0122	-20	-71
814	5.3	5	24	44.89	+17	55	34.7		17	53.5	+ 9	43.5	+1.0813	0.5674	+0.0072	+90	+49

Full Moon—July 30^d 16^h 47^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

AUGUST

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
832	4.7	5 29	46.83		+18 33	48.2		10 20	07.5		+11 52.9		+0.4128	0.5682	+0.0032	+62	+ 7
836	5.5	5 31	05.74		18 30	38.0		20 42.5			-11 33.4		+0.4704	0.5684	+0.0021	+67	+10
888	6.0	5 49	55.91		19 51	24.9		11 5 00.6			- 3 32.7		-1.0041	0.5714	-0.0131	-27	-71
895	5.9	5 52	29.27		19 44	28.7		6 07.9			- 2 27.8		-0.8968	0.5717	0.0152	-18	-71
913	5.2	6 00	59.93		19 41	27.7		9 51.2			+ 1 07.7		-0.9109	0.5729	0.0221	-19	-71
934	6.4	6 08	36.01		+18 08	18.2		13 10.0			+ 4 19.3		+0.6454	0.5739	-0.0282	+85	+18
940	5.7	6 09	33.78		19 47	58.4		13 35.1			+ 4 43.6		-1.1185	0.5741	0.0290	-37	-71
943	6.2	6 11	06.86		18 41	27.7		14 15.6			+ 5 22.6		+0.0305	0.5743	0.0303	+37	-17
944	5.7	6 12	03.10		17 55	04.5		14 40.0			+ 5 46.2		+0.8328	0.5744	0.0310	+90	+29
947	5.2	6 12	24.29		19 10	12.9		14 49.2			+ 5 55.0		-0.4918	0.5744	0.0313	+ 7	-49
970	6.5	6 19	00.54		+17 46	56.9		17 41.1			+ 8 40.8		+0.8717	0.5752	-0.0366	+90	+31
1029	5.1	6 39	59.16		17 41	08.6		12 2 44.5			- 6 35.3		+0.5607	0.5774	0.0535	+75	+10
1040	6.2	6 44	57.77		18 14	17.1		4 52.9			- 4 31.5		-0.1360	0.5779	0.0575	+27	-29
1072	6.2	7 00	00.48		17 48	51.7		11 20.0			+ 1 41.6		-0.1035	0.5791	0.0695	+29	-28
1073	6.0	7 00	09.43		16 44	01.7		11 23.8			+ 1 45.3		+1.0168	0.5791	0.0696	+90	+38
1106	3.6	7 15	42.24		+16 36	54.2		18 02.5			+ 8 09.5		+0.6342	0.5801	-0.0817	+83	+12
1141	5.6	7 29	24.54		17 10	26.4		23 53.0			-10 12.7		-0.4524	0.5809	0.0921	+10	-52
1147	5.1	7 31	14.09		15 54	57.1		13 0 39.7			- 9 27.8		+0.7750	0.5809	0.0935	+90	+19
1635	5.4	11 15	08.96		2 14	19.8		17 0 21.6			+10 46.0		-0.5886	0.5774	0.1969	+ 3	-75
1637	6.0	11 16	46.84		1 52	41.0		1 03.8			+11 26.7		-0.3677	0.5774	0.1970	+15	-58
1649	6.3	11 21	10.16		+ 0 21	35.2		2 57.4			-10 43.8		+0.7718	0.5773	-0.1973	+90	+ 8
1652	5.5	11 21	54.27		+ 1 38	08.9		3 16.4			-10 25.5		-0.5620	0.5773	0.1973	+ 4	-73
1685	4.5	11 34	49.20		- 0 35	40.4		8 50.7			- 5 03.2		+0.5593	0.5772	0.1976	+73	- 4
1708	6.2	11 46	54.11		0 05	16.3		14 03.3			- 0 01.8		-0.9741	0.5772	0.1972	-21	-90
1735	6.4	11 58	54.05		1 32	10.0		19 13.7			+ 4 57.5		-0.5500	0.5772	0.1963	+ 5	-72
1744	6.5	12 03	52.14		- 2 54	01.2		21 22.2			+ 7 01.3		+0.3891	0.5773	-0.1957	+59	-14
1753	7.1	12 09	14.22		2 28	02.3		23 40.9			+ 9 15.1		-0.4941	0.5774	0.1950	+ 8	-67
1754	6.9	12 09	14.22		3 32	50.4		23 40.9			+ 9 15.1		+0.5817	0.5774	0.1950	+74	- 3
1768	7.0	12 16	01.30		3 43	26.2		18 2 36.2			-11 56.0		+0.1895	0.5774	0.1940	+46	-25
1769	6.6	12 16	01.71		3 43	06.2		2 36.4			-11 55.8		+0.1834	0.5774	0.1940	+45	-25
1779	6.7	12 21	07.18		- 4 44	38.8		4 47.9			- 9 49.0		+0.7815	0.5775	-0.1931	+86	+ 8
1787	6.0	12 25	43.66		4 23	08.5		6 46.8			- 7 54.4		+0.0427	0.5777	0.1921	+37	-33
1792	7.1	12 27	53.90		5 47	35.5		7 42.8			- 7 00.4		+1.2664	0.5777	0.1916	+85	+49
1795	7.1	12 28	42.40		3 49	53.3		8 03.7			- 6 40.3		-0.7555	0.5777	0.1915	- 8	-90
1798	6.3	12 29	30.57		4 49	25.2		8 24.4			- 6 20.3		+0.1674	0.5778	0.1913	+44	-26
1807	5.9	12 34	39.03		- 5 36	11.5		10 37.0			- 4 12.6		+0.5233	0.5779	-0.1902	+68	- 6
1814	7.0	12 36	35.24		4 08	43.7		11 26.9			- 3 24.4		-1.0883	0.5780	0.1896	-31	-90
1817	6.9	12 37	22.30		5 52	20.9		11 47.1			- 3 04.9		+0.5700	0.5780	0.1894	+72	- 4
1836	6.3	12 45	24.67		6 04	29.1		15 14.2			+ 0 14.7		+0.1217	0.5782	0.1873	+41	-28
1843	6.9	12 47	56.77		7 24	23.2		16 19.4			+ 1 17.5		+1.2472	0.5783	0.1866	+83	+46
1865	7.2	12 56	51.33		- 5 51	59.5		20 08.5			+ 4 58.4		-0.9972	0.5786	-0.1839	-24	-90
1886	5.7	13 06	22.65		8 45	44.7		19 0 13.0			+ 8 54.0		+1.1525	0.5790	0.1806	+82	+36
1890	7.4	13 07	36.81		7 26	03.3		0 44.7			+ 9 24.6		-0.2700	0.5790	0.1802	+18	-51
1911	7.1	13 15	33.97		8 30	50.4		4 08.6			-11 18.9		+0.2020	0.5794	0.1772	+45	-24
1917	7.0	13 19	01.92		9 46	56.6		5 37.4			- 9 53.4		+1.2097	0.5795	0.1759	+81	+42
1945	5.4	13 30	47.03		- 9 57	05.4		10 37.9			- 5 03.8		+0.5112	0.5801	-0.1709	+65	- 7
1946	7.2	13 31	01.53		8 13	50.8		10 44.1			- 4 57.8		-1.2296	0.5800	0.1708	-48	-90
1948	7.4	13 32	07.39		8 24	20.4		11 12.1			- 4 30.8		-1.1343	0.5802	0.1703	-37	-90
Jupiter	-1.4	13 41	17.67		9 20	28.3		15 06.1			- 0 45.3		-0.8545	0.5750	0.1638	-17	-90
1973	6.2	13 45	01.97		9 30	06.3		16 41.4			+ 0 46.5		-0.9558	0.5808	0.1643	-24	-90
2000	7.1	13 56	13.59		-11 51	20.1		21 26.2			+ 5 20.9		+0.6392	0.5814	-0.1588	+74	0
2013	7.5	14 01	14.58		10 46	03.5		23 33.7			+ 7 23.7		-0.7882	0.5816	0.1561	-14	-90
Neptune	7.8	14 03	08.24		10 39	52.5		20 0 21.7			+ 8 10.0		-1.0168	0.5810	0.1548	-29	-90
2025	6.8	14 06	15.87		11 37	57.2		1 41.1			+ 9 26.4		-0.2478	0.5819	0.1534	+17	-50
2036	6.9	14 11	29.59		-11 38	39.1		3 53.7			+11 34.1		-0.5721	0.5822	-0.1505	- 1	-75

New Moon—Aug. 15^d 03^h 33^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

AUGUST

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	''	d	h	m	h	m				°	'
2053	4.6	14	16	52.20	-13	10	49.7	20	6	09.8	-10	14.7	+0.6360	0.5824	-0.1475	+72	0
2065	6.6	14	23	03.08	13	09	56.9		8	46.2	-7	44.1	+0.2420	0.5828	0.1439	+43	-22
2070	6.7	14	25	30.63	13	10	23.4		9	48.3	-6	44.3	+0.1012	0.5829	0.1424	+35	-29
2092	7.2	14	38	16.39	13	52	07.5		15	10.5	-1	34.0	+0.0595	0.5835	0.1346	+32	-32
2105	6.6	14	43	40.95	15	17	06.8		17	26.7	+0	37.2	+1.1892	0.5838	0.1311	+75	+42
2114	5.8	14	47	03.10	-13	58	35.7		18	51.6	+1	58.9	-0.3173	0.5840	-0.1289	+10	-55
2159	5.3	15	04	19.30	16	05	46.7	21	2	05.6	+8	56.9	+0.9380	0.5847	0.1174	+74	+20
2160	6.6	15	04	30.70	16	19	26.9		2	10.4	+9	01.5	+1.1597	0.5847	0.1173	+74	+40
2170	6.8	15	09	31.46	16	00	10.0		4	16.1	+11	02.6	+0.5923	0.5849	0.1138	+65	-2
2193	6.1	15	18	42.86	15	23	56.2		8	06.5	-9	15.7	-0.4451	0.5852	0.1073	+1	-64
2196	6.7	15	20	43.60	-14	59	09.8		8	56.9	-8	27.1	-0.9544	0.5853	-0.1059	-30	-90
2209	5.9	15	25	55.72	16	34	19.5		11	07.2	-6	21.7	+0.4321	0.5854	0.1021	+51	-11
2210	6.8	15	26	19.72	15	33	27.2		11	17.2	-6	12.1	-0.6168	0.5855	0.1018	-9	-81
2211	7.2	15	27	14.64	17	17	52.4		11	40.1	-5	50.0	+1.1148	0.5855	0.1012	+73	+36
2213	5.9	15	28	20.71	16	28	02.6		12	07.6	-5	23.5	+0.2237	0.5855	0.1003	+38	-23
2218	5.6	15	30	35.31	-16	42	44.2		13	03.8	-4	29.4	+0.3799	0.5856	-0.0987	+48	-14
2232	7.2	15	36	20.68	17	31	44.6		15	27.7	-2	10.8	+0.9805	0.5857	0.0944	+73	+24
2246	7.4	15	41	36.75	16	44	16.4		17	39.5	-0	04.0	-0.0284	0.5858	0.0905	+22	-37
2259	6.7	15	47	30.75	17	46	31.6		20	06.9	+2	17.9	+0.8134	0.5859	0.0860	+73	+12
2271	4.3	15	51	28.64	16	36	27.7		21	46.0	+3	53.3	-0.5182	0.5860	0.0830	-5	-71
2291	5.5	15	58	00.77	-16	24	40.5	22	0	29.3	+6	30.5	-0.9388	0.5860	-0.0780	-31	-90
2301	6.8	16	02	40.44	18	25	32.6		2	25.7	+8	22.6	+0.9737	0.5861	0.0743	+72	+24
2313	7.0	16	05	44.65	18	07	51.2		3	42.4	+9	36.4	+0.5788	0.5860	0.0719	+60	-2
2316	6.4	16	07	32.85	18	13	51.0		4	27.4	+10	19.8	+0.6279	0.5861	0.0705	+64	+1
2331	6.4	16	12	16.58	18	25	45.3		6	25.5	-11	46.5	+0.6964	0.5860	0.0668	+70	+5
2341	7.2	16	16	05.07	-17	17	08.7		8	00.7	-10	14.9	-0.5793	0.5860	-0.0638	-10	-77
2345	6.9	16	17	11.78	18	43	39.2		8	28.4	-9	48.2	+0.8700	0.5861	0.0629	+72	+16
2352	6.7	16	20	31.78	16	55	17.3		9	51.7	-8	28.0	-1.0684	0.5859	0.0603	-43	-90
2361	4.8	16	24	38.21	18	21	43.9		11	34.4	-6	49.2	+0.3100	0.5859	0.0570	+39	-17
2390	6.7	16	36	05.41	18	08	12.9		16	20.8	-2	13.5	-0.1715	0.5857	0.0478	+10	-45
2391	7.1	16	36	10.83	-18	44	32.7		16	23.0	-2	11.3	+0.4497	0.5857	-0.0477	+48	-10
2396	6.6	16	38	55.42	17	58	42.8		17	31.7	-1	05.2	-0.3896	0.5856	0.0455	-2	-60
2399	5.0	16	39	11.58	17	39	42.2		17	38.4	-0	58.7	-0.7209	0.5856	0.0453	-21	-90
2408	6.9	16	43	05.82	19	03	37.2		19	16.1	+0	35.4	+0.6482	0.5854	0.0421	+64	+2
2436	6.3	16	54	39.00	19	28	26.6	23	0	05.6	+5	14.1	+0.8960	0.5850	0.0327	+71	+18
2441	6.5	16	57	20.65	-18	11	01.6		1	13.2	+6	19.2	-0.4714	0.5849	-0.0304	-7	-67
2448	6.4	16	59	26.91	18	49	27.8		2	06.0	+7	10.0	+0.1641	0.5848	0.0287	+27	-26
2463	6.9	17	07	49.87	19	22	59.3		5	36.6	+10	32.8	+0.6536	0.5843	0.0218	+63	+2
2485	7.4	17	14	20.62	17	52	03.7		8	20.5	-10	49.4	-0.9673	0.5839	0.0165	-39	-90
2497	6.6	17	18	09.52	19	17	20.9		9	56.6	-9	16.8	+0.4811	0.5837	0.0133	+47	-8
2508	6.3	17	22	12.74	-18	24	25.0		11	38.8	-7	38.4	-0.4532	0.5834	-0.0100	-8	-65
2531	7.3	17	34	37.02	18	57	53.1		16	52.4	-2	36.4	+0.0999	0.5824	+0.0003	+21	-29
2555	7.5	17	45	03.07	18	05	26.9		21	17.1	+1	38.7	-0.7899	0.5814	0.0088	-28	-90
2571	6.9	17	49	22.94	19	30	45.3		23	07.3	+3	24.8	+0.7100	0.5810	0.0123	+69	+6
2573	7.3	17	49	54.29	19	06	35.9		23	20.6	+3	37.6	+0.2934	0.5809	0.0127	+34	-18
2578	6.4	17	53	30.16	-18	47	39.1	24	0	52.2	+5	05.9	-0.0140	0.5806	+0.0156	+16	-36
2596	7.3	17	59	27.22	19	06	15.3		3	24.1	+7	32.3	+0.3553	0.5799	0.0205	+39	-15
2611	6.8	18	03	07.59	19	45	21.5		4	58.1	+9	02.8	+1.0705	0.5795	0.0234	+71	+33
2640	6.1	18	13	06.29	18	40	23.9		9	14.1	-10	50.4	+0.0571	0.5783	0.0315	+22	-32
2647	6.4	18	15	04.28	18	28	37.4		10	04.7	-10	01.7	-0.1211	0.5781	0.0330	+12	-42
2649	6.6	18	15	26.47	-18	48	45.3		10	14.2	-9	52.5	+0.2353	0.5780	+0.0333	+32	-22
2653	6.4	18	16	18.86	18	38	03.6		10	36.7	-9	30.9	+0.0614	0.5779	0.0340	+22	-32
2658	5.4-6.2	18	18	58.35	18	52	38.9		11	45.2	-8	24.8	+0.3561	0.5775	0.0361	+40	-15
2674	6.0	18	25	33.01	17	49	27.4		14	35.0	-5	41.1	-0.6378	0.5766	0.0413	-16	-84
2680	5.8	18	27	47.31	-18	45	14.8		15	33.0	-4	45.2	+0.3778	0.5764	+0.0431	+42	-14

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

AUGUST-SEPTEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	''	d	h	m	h	m				°	°
2685	7.0	18 28	54.81		-18 56	02.2		24 16	02.1		- 4 17.1		+0.5877	0.5762	+0.0440	+58	- 2
2686	5.2	18 29	02.23		18 25	47.5		16 05.3		- 4 14.0		+0.0613	0.5762	0.0441	+23	-32	
2687	6.5-7.3	18 29	28.52		19 09	11.1		16 16.7		- 4 03.1		+0.8284	0.5761	0.0444	+71	+14	
2690	7.0	18 30	46.13		18 23	50.5		16 50.2		- 3 30.7		+0.0607	0.5759	0.0454	+23	-32	
2699	7.2	18 32	58.68		19 17	58.4		17 47.5		- 2 35.5		+1.0519	0.5756	0.0472	+71	+31	
2705	6.8	18 35	28.85		-17 15	53.9		18 52.6		- 1 32.7		-1.0319	0.5752	+0.0491	-41	-90	
2722	7.1	18 43	14.11		17 35	10.4		22 14.7		+ 1 42.1		-0.5198	0.5741	0.0551	- 8	-71	
2731	6.5	18 46	21.42		18 38	44.3		23 36.3		+ 3 00.9		+0.6711	0.5736	0.0575	+67	+ 3	
2737	6.8	18 48	57.45		17 12	04.6		25 0 44.4		+ 4 06.5		-0.7824	0.5732	0.0595	-23	-90	
2745	6.9	18 50	42.60		18 41	06.7		1 30.3		+ 4 50.9		+0.8258	0.5729	0.0608	+72	+13	
2755	6.6	18 53	50.44		-18 45	39.4		2 52.5		+ 6 10.1		+0.9910	0.5724	+0.0632	+72	+25	
2764	6.3	18 57	03.08		18 37	15.7		4 17.0		+ 7 31.6		+0.9347	0.5719	0.0656	+72	+21	
2789	7.3	19 04	56.37		17 18	15.3		7 45.2		+10 52.5		-0.2157	0.5706	0.0714	+10	-48	
2808	7.4	19 12	28.63		17 24	58.5		11 05.1		- 9 54.5		+0.1498	0.5692	0.0770	+31	-27	
2812	7.5	19 13	05.28		16 10	08.0		11 21.4		- 9 38.9		-1.1475	0.5691	0.0774	-49	-90	
2826	4.0	19 19	18.02		-17 55	24.3		14 07.0		- 6 59.0		+0.9275	0.5680	+0.0819	+73	+20	
2827	4.6	19 19	23.07		16 01	51.1		14 09.2		- 6 56.8		-1.0718	0.5679	0.0819	-41	-90	
2830	6.9	19 21	27.23		17 16	24.2		15 04.5		- 6 03.4		+0.3191	0.5676	0.0834	+42	-17	
2856	6.6-7.6	19 31	58.37		16 27	42.8		19 47.0		- 1 30.8		-0.1303	0.5657	0.0908	+17	-43	
2871	7.1	19 36	51.98		17 00	01.6		21 59.0		+ 0 36.8		+0.6447	0.5648	0.0941	+68	+ 1	
2874	6.8	19 37	32.99		-15 15	34.8		22 17.5		+ 0 54.7		-1.1736	0.5646	+0.0946	-50	-90	
2876	5.4	19 38	22.86		16 23	09.6		22 40.0		+ 1 16.4		+0.0573	0.5644	0.0951	+28	-32	
2880	5.1	19 40	10.82		16 13	08.2		23 28.8		+ 2 03.5		-0.0422	0.5641	0.0964	+23	-38	
2883	5.5	19 41	13.66		15 33	49.7		23 57.2		+ 2 30.9		-0.6922	0.5639	0.0971	-13	-90	
2889	7.1	19 44	48.16		17 10	38.5		26 1 34.3		+ 4 04.7		+1.1811	0.5632	0.0994	+73	+43	
2900	6.8	19 49	23.25		-14 52	47.8		3 39.2		+ 6 05.3		-1.0509	0.5623	+0.1025	-37	-90	
2905	6.4	19 50	48.05		14 42	24.3		4 17.8		+ 6 42.6		-1.1691	0.5620	0.1034	-48	-90	
2913	5.0	19 55	37.97		15 35	56.5		6 30.0		+ 8 50.4		+0.0112	0.5610	0.1065	+26	-34	
2968	6.2	20 18	28.84		14 54	47.0		17 01.9		- 4 58.9		+0.4776	0.5563	0.1206	+57	- 8	
2969	3.2	20 18	43.01		14 54	34.8		17 08.5		- 4 52.5		+0.4873	0.5563	0.1207	+58	- 8	
3002	6.2	20 31	55.32		-13 51	38.2		23 18.9		+ 1 05.7		+0.1342	0.5535	+0.1282	+36	-28	
3045	6.0	20 48	26.80		12 41	44.1		27 7 07.8		+ 8 39.4		-0.0781	0.5501	0.1370	+25	-40	
3054	6.4	20 50	51.66		11 43	38.4		8 16.8		+ 9 46.2		-0.9602	0.5496	0.1382	-26	-90	
3093	4.5	21 07	22.28		11 32	11.0		16 12.4		- 6 33.4		-0.0394	0.5462	0.1461	+28	-37	
3104	6.5	21 12	04.32		10 46	24.2		18 28.9		- 4 21.2		-0.5272	0.5452	0.1482	+ 2	-70	
3133	5.8	21 23	01.52		- 9 55	18.1		23 48.9		+ 0 48.7		-0.6442	0.5430	+0.1529	- 4	-82	
3467	6.5	23 29	51.93		- 1 18	39.5		30 16 24.6		- 8 31.9		+0.9613	0.5242	0.1784	+89	+20	
3494	4.6	23 39	57.85		+ 1 33	20.4		21 43.0		- 3 22.7		-1.2486	0.5235	0.1782	-46	-89	
3507	6.4	23 46	43.97		1 59	16.8		31 1 16.8		+ 0 05.0		-1.0916	0.5230	0.1778	-30	-89	
3508	5.8	23 47	22.06		0 50	58.7		1 36.9		+ 0 24.5		+0.2229	0.5230	0.1778	+48	-23	
3515	6.2	23 50	59.29		+ 1 51	49.7		3 31.4		+ 2 15.6		-0.5565	0.5228	+0.1775	+ 5	-72	
98	6.2	0 45	16.78		6 31	04.1		1 8 11.8		+ 6 06.5		-0.7230	0.5221	0.1684	- 5	-84	
103	6.1	0 46	10.13		7 04	36.3		8 39.9		+ 6 33.8		-1.2633	0.5221	0.1682	-49	-83	
104	5.8	0 46	14.32		5 04	14.4		8 42.2		+ 6 36.0		+0.9653	0.5222	0.1682	+90	+22	
136	6.3	0 57	42.53		6 15	45.6		14 44.9		-11 31.8		+0.6523	0.5226	0.1651	+82	+ 3	
146	4.4	1 00	49.27		+ 7 40	12.0		16 23.1		- 9 56.4		-0.6381	0.5227	+0.1642	0	-77	
180	5.6	1 11	35.64		7 21	32.9		22 02.8		- 4 26.6		+0.6264	0.5233	0.1608	+80	+ 1	
181	6.5	1 11	37.13		7 21	43.0		22 03.6		- 4 25.8		+0.6254	0.5233	0.1608	+80	+ 1	
272	5.9	1 48	41.57		10 50	26.1		2 17 23.7		- 9 39.5		-0.2543	0.5264	0.1467	+21	-46	
290	6.1	1 57	14.27		12 05	46.1		21 48.7		- 5 22.4		-1.0071	0.5272	0.1429	-25	-78	
422	5.5	2 49	13.63		+14 54	46.7		4 0 16.2		- 3 42.5		-0.6805	0.5343	+0.1163	- 3	-73	
Mars	-0.6	3 30	59.25		16 45	43.4		20 56.0		- 7 41.0		-0.5743	0.5251	0.0860	+ 2	-62	
527	6.3	3 37	06.24		16 24	10.8		23 54.9		- 4 47.8		+0.0874	0.5422	0.0867	+40	-19	
577	6.0	3 50	48.91		17 12	16.6		5 6 33.1		+ 1 37.7		-0.2480	0.5446	0.0775	+21	-38	
590	6.3	3 58	15.87		+17 10	50.3		10 07.9		+ 5 05.7		+0.0467	0.5459	+0.0723	+38	-20	

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

SEPTEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination	<i>T</i>			<i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s		d	h	m					°	°
593	5.8	3	58	26.56	+18 04 40.6	5	10	13.0	+ 5 10.7	-0.9305	0.5459	+0.0722	-21	-72
610	6.2	4	05	38.05	17 13 47.8		13	39.4	+ 8 30.4	+0.2385	0.5472	0.0672	+50	- 9
620	6.3	4	10	09.75	17 10 17.9		15	48.8	+10 35.6	+0.4435	0.5479	0.0640	+64	+ 2
639	6.0	4	18	01.59	18 38 38.2		19	32.7	- 9 47.7	-0.9370	0.5493	0.0583	-21	-72
648	3.9	4	20	33.64	17 26 45.7		20	44.6	- 8 38.2	+0.4399	0.5498	0.0565	+64	+ 3
653	4.8	4	21	43.38	+17 20 55.0		21	17.5	- 8 06.3	+0.5769	0.5500	+0.0557	+76	+11
654	6.0	4	22	33.15	18 56 50.0		21	41.0	- 7 43.6	-1.1459	0.5501	0.0551	-40	-72
658	4.2	4	23	06.46	17 50 02.3		21	56.8	- 7 28.4	+0.0832	0.5502	0.0547	+40	-16
668	3.6	4	26	12.74	19 05 20.6		23	24.5	- 6 03.5	-1.2071	0.5508	0.0524	-48	-71
684	6.2	4	31	09.91	17 55 47.5	6	1	44.2	- 3 48.3	+0.1745	0.5516	0.0487	+45	-11
718	6.1	4	43	52.46	+18 39 36.9		7	40.7	+ 1 56.4	-0.3583	0.5538	+0.0393	+15	-41
730	5.1	4	48	57.84	18 46 10.8		10	02.6	+ 4 13.6	-0.3883	0.5547	0.0355	+13	-42
736	6.2	4	52	33.01	19 25 06.7		11	42.4	+ 5 50.1	-1.0351	0.5552	0.0327	-29	-71
764	5.0	5	05	00.81	18 35 23.2		17	27.4	+11 23.6	+0.0247	0.5573	0.0232	+36	-16
798	6.4	5	18	30.40	19 46 19.7		23	38.2	- 6 38.1	-1.1393	0.5595	0.0127	-40	-71
814	5.3	5	24	45.69	+17 55 36.0	7	2	29.2	- 3 52.9	+0.8783	0.5604	+0.0078	+90	+34
832	4.7	5	29	47.63	18 33 49.4		4	46.3	- 1 40.5	+0.2056	0.5612	0.0039	+48	- 4
836	5.5	5	31	06.54	18 30 39.1		5	22.1	- 1 05.9	+0.2644	0.5614	+0.0028	+51	- 1
888	6.0	5	49	56.70	19 51 25.6		13	51.8	+ 7 06.4	-1.2158	0.5641	-0.0121	-50	-71
895	5.9	5	52	30.05	19 44 29.4		15	00.6	+ 8 12.8	-1.1063	0.5645	0.0140	-36	-71
913	5.2	6	01	00.70	+19 41 28.3		18	49.1	+11 53.4	-1.1165	0.5657	-0.0208	-37	-71
934	6.4	6	08	36.77	18 08 18.8		22	12.5	- 8 50.3	+0.4575	0.5666	0.0268	+66	+ 7
943	6.2	6	11	07.62	18 41 28.2		23	19.6	- 7 45.5	-0.1617	0.5669	0.0289	+26	-27
944	5.7	6	12	03.85	17 55 05.0		23	44.6	- 7 21.3	+0.6482	0.5670	0.0296	+85	+18
947	5.2	6	12	25.04	19 10 13.3		23	54.0	- 7 12.3	-0.6880	0.5671	0.0299	- 5	-67
970	6.5	6	19	01.29	+17 46 57.4	8	2	49.9	- 4 22.5	+0.6909	0.5679	-0.0351	+90	+20
1029	5.1	6	39	59.87	17 41 08.7		12	05.5	+ 4 33.7	+0.3881	0.5703	0.0517	+60	+ 1
1040	6.2	6	44	58.48	18 14 17.1		14	16.7	+ 6 40.2	-0.3116	0.5708	0.0556	+17	-39
1072	6.2	7	00	01.16	17 48 51.5		20	52.0	-10 58.4	-0.2699	0.5723	0.0673	+20	-38
1073	6.0	7	00	10.10	16 44 01.7		20	55.9	-10 54.6	+0.8592	0.5723	0.0674	+90	+27
1096	5.3	7	10	59.70	+16 13 45.0	9	1	39.3	- 6 21.3	+1.0465	0.5732	-0.0758	+90	+40
1106	3.6	7	15	42.89	16 36 54.0		3	42.6	- 4 22.4	+0.4829	0.5737	0.0794	+68	+ 3
1141	5.6	7	29	25.16	17 10 25.9		9	39.7	+ 1 22.0	-0.6025	0.5748	0.0897	+ 1	-64
1147	5.1	7	31	14.70	15 54 56.7		10	27.2	+ 2 07.8	+0.6343	0.5749	0.0910	+83	+11
1197	6.0	7	54	38.32	15 54 03.1		20	34.1	+11 53.0	-0.3585	0.5764	0.1080	+15	-47
1198	6.2	7	56	09.69	+16 37 47.7		21	13.5	-11 29.0	-1.1821	0.5765	-0.1091	-43	-74
1234	6.1	8	08	39.21	14 45 07.6	10	2	36.4	- 6 17.7	+0.1438	0.5771	0.1177	+43	-19
1237	6.4	8	10	03.03	14 07 40.8		3	12.5	- 5 42.9	+0.7143	0.5773	0.1187	+90	+13
1271	5.9	8	26	18.52	14 20 53.0		10	11.9	+ 1 01.3	-0.3799	0.5780	0.1295	+14	-51
1281	6.4	8	31	27.22	13 23 56.5		12	24.4	+ 3 09.1	+0.3008	0.5783	0.1328	+53	-12
1309	5.7	8	40	55.24	+12 49 46.2		16	28.1	+ 7 04.0	+0.3296	0.5786	-0.1387	+55	-11
1318	5.7	8	44	39.59	12 15 43.4		18	04.3	+ 8 36.7	+0.6829	0.5788	0.1410	+88	+ 9
1332	5.7	8	53	39.63	11 47 04.3		21	55.6	-11 40.4	+0.6127	0.5791	0.1464	+79	+ 4
1341	4.3	8	56	13.09	12 01 05.8		23	01.3	-10 37.0	+0.2140	0.5792	0.1479	+48	-18
1359	5.1	9	05	29.96	10 50 06.6	11	2	59.7	- 6 47.3	+0.8142	0.5795	0.1531	+90	+15
1364	6.5	9	07	31.07	+11 43 59.2		3	51.5	- 5 57.4	-0.2275	0.5796	-0.1542	+22	-44
1381	6.3	9	15	36.27	11 40 29.1		7	18.9	- 2 37.5	-0.7084	0.5798	0.1585	- 5	-79
1397	5.5	9	26	14.02	9 14 14.8		11	51.4	+ 1 45.2	+1.0169	0.5802	0.1640	+90	+28
1410	5.3	9	29	44.06	+ 9 53 55.3		13	21.1	+ 3 11.6	+0.1042	0.5802	0.1657	+41	-26
1890	7.4	13	07	36.59	- 7 26 02.1	15	9	16.5	- 4 15.8	-0.1475	0.5894	0.1819	+25	-44
1911	7.1	13	15	33.73	- 8 30 49.0		12	33.8	- 1 05.9	+0.3222	0.5898	-0.1790	+52	-17
1945	5.4	13	30	46.77	9 57 03.9		18	50.6	+ 4 56.7	+0.6349	0.5906	0.1728	+75	0
1946	7.2	13	31	01.26	8 13 49.5		18	56.6	+ 5 02.5	-1.0794	0.5906	0.1727	-33	-90
1948	7.4	13	32	07.12	8 24 19.1		19	23.7	+ 5 28.6	-0.9850	0.5907	0.1721	-25	-90
1973	6.2	13	45	01.68	- 9 30 04.9	16	0	42.3	+10 35.1	-0.8026	0.5914	-0.1662	-14	-90

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

SEPTEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		<i>h</i>	<i>m</i>	<i>s</i>	<i>°</i>	<i>'</i>	<i>"</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>s</i>				<i>°</i>	<i>°</i>
2000	7.1	13	56	13.28	-11	51	18.5	16	5	17.8	- 8	59.8	+0.7733	0.5920	+79	+ 9
Jupiter	-1.3	13	59	25.59	11	06	13.4		6	36.5	- 7	44.0	-0.1797	0.5850	+21	-46
2013	7.5	14	01	14.26	10	46	02.1		7	21.1	- 7	01.2	-0.6301	0.5923	- 4	-81
Neptune	7.8	14	05	43.41	10	54	56.8		9	11.2	- 5	15.2	-0.7711	0.5913	-13	-90
2025	6.8	14	06	15.54	11	37	55.7		9	24.4	- 5	02.6	-0.0959	0.5925	+25	-41
2036	6.9	14	11	29.25	-11	38	37.6		11	32.7	- 2	59.2	-0.4131	0.5927	+ 7	-61
2053	4.6	14	16	51.85	13	10	48.1		13	44.5	- 0	52.4	+0.7788	0.5929	+77	+ 9
2060	6.3	14	21	11.66	11	31	27.3		15	30.5	+ 0	49.6	-1.1251	0.5931	-40	-90
2065	6.6	14	23	02.72	13	09	55.4		16	15.9	+ 1	33.2	+0.3931	0.5932	+53	-13
2070	6.7	14	25	30.27	13	10	21.9		17	16.0	+ 2	31.1	+0.2553	0.5933	+44	-21
2092	7.2	14	38	16.01	-13	52	05.9		22	28.0	+ 7	31.2	+0.2185	0.5937	+41	-23
2114	5.8	14	47	02.70	13	58	34.2	17	2	02.3	+10	57.3	-0.1500	0.5939	+19	-44
2159	5.3	15	04	18.89	16	05	45.2		9	03.3	- 6	17.8	+1.0919	0.5942	+74	+33
2170	6.8	15	09	31.03	16	00	08.5		11	10.1	- 4	15.9	+0.7525	0.5942	+74	+ 8
2193	6.1	15	18	42.43	15	23	54.8		14	53.9	- 0	40.7	-0.2684	0.5942	+11	-51
2196	6.7	15	20	43.16	-14	59	08.5		15	42.9	+ 0	06.4	-0.7702	0.5943	-18	-90
2208	7.4	15	25	23.22	14	48	33.2		17	36.5	+ 1	55.7	-1.1475	0.5942	-47	-90
2209	5.9	15	25	55.28	16	34	18.1		17	49.5	+ 2	08.2	+0.5982	0.5942	+64	- 1
2210	6.8	15	26	19.27	15	33	25.9		17	59.2	+ 2	17.6	-0.4363	0.5942	+ 1	-63
2213	5.9	15	28	20.27	16	28	01.3		18	48.3	+ 3	04.8	+0.3931	0.5942	+49	-13
2218	5.6	15	30	34.86	-16	42	42.9		19	43.0	+ 3	57.3	+0.5477	0.5942	+60	- 4
2232	7.2	15	36	20.23	17	31	43.3		22	03.1	+ 6	12.1	+1.1413	0.5941	+73	+39
2246	7.4	15	41	36.30	16	44	15.1	18	0	11.4	+ 8	15.4	-0.1465	0.5940	+32	-27
2247	5.6	15	41	44.70	15	32	25.3		0	14.8	+ 8	18.7	+1.0635	0.5940	-40	-90
2259	6.7	15	47	30.29	17	46	30.4		2	35.1	+10	33.6	+0.9785	0.5939	+73	+24
2271	4.3	15	51	28.18	-16	36	26.5		4	11.7	-11	53.5	-0.3358	0.5938	+ 5	-56
2280	6.8	15	54	44.65	15	54	48.0		5	31.5	-10	36.7	-1.1463	0.5937	-49	-90
2291	5.5	15	58	00.30	16	24	39.5		6	51.0	- 9	20.3	-0.7506	0.5936	-19	-90
2301	6.8	16	02	39.96	18	25	31.5		8	44.7	- 7	30.9	+1.1390	0.5934	+72	+39
2313	7.0	16	05	44.18	18	07	50.1		9	59.6	- 6	18.9	+0.7493	0.5933	+72	+ 8
2316	6.4	16	07	32.38	-18	13	49.9		10	43.6	- 5	36.5	+0.7979	0.5931	+72	+11
2331	6.4	16	12	16.10	18	25	44.3		12	39.1	- 3	45.5	+0.8662	0.5929	+72	+16
2341	7.2	16	16	04.59	17	17	07.7		14	12.2	- 2	16.0	-0.3946	0.5927	0	-60
2345	6.9	16	17	11.30	18	43	38.2		14	39.4	- 1	49.8	+1.0383	0.5926	+72	+29
2352	6.7	16	20	31.31	16	55	16.3		16	00.9	- 0	31.4	-0.8782	0.5925	-29	-90
2361	4.8	16	24	37.72	-18	21	43.0		17	41.4	+ 1	05.3	+0.4851	0.5922	+51	- 7
2390	6.7	16	36	04.92	18	08	12.1		22	22.1	+ 5	35.4	+0.0091	0.5914	+20	-34
2391	7.1	16	36	10.35	18	44	31.9		22	24.4	+ 5	37.5	-0.6239	0.5914	+62	+ 1
2396	6.6	16	38	54.94	17	58	42.1		23	31.7	+ 6	42.3	-0.2069	0.5912	+ 8	-48
2399	5.0	16	39	11.10	17	39	41.5		23	38.3	+ 6	48.7	-0.5348	0.5912	-10	-72
2408	6.9	16	43	05.33	-19	03	36.5	19	1	14.3	+ 8	21.0	+0.8205	0.5908	+71	+13
2436	6.3	16	54	38.51	19	28	26.0		5	58.8	-11	05.3	+1.0663	0.5898	+71	+32
2441	6.5	16	57	20.16	18	11	01.1		7	05.3	-10	01.3	-0.2886	0.5895	+ 2	-53
2448	6.4	16	59	26.42	18	49	27.2		7	57.3	- 9	11.3	+0.3410	0.5893	+38	-16
2460	6.1	17	05	51.17	17	33	12.5		10	35.9	- 6	38.6	-1.0313	0.5887	-44	-90
2463	6.9	17	07	49.38	-19	22	58.8		11	24.7	- 5	51.6	+0.8260	0.5884	+71	+14
2485	7.4	17	14	20.13	17	52	03.2		14	06.3	- 3	16.1	-0.7821	0.5877	-27	-90
2495	6.0	17	17	29.35	17	42	45.0		15	24.7	- 2	00.7	-0.9624	0.5873	-39	-90
2497	6.6	17	18	09.03	19	17	20.5		15	41.2	- 1	44.8	+0.6545	0.5872	+62	+ 3
2508	6.3	17	22	12.25	18	24	24.6		17	22.1	- 0	07.7	-0.2730	0.5867	+ 1	-52
2531	7.3	17	34	36.54	-18	57	52.9		22	32.2	+ 4	50.8	+0.2747	0.5851	+32	-19
2548	7.5	17	41	44.81	17	43	27.5	20	1	31.3	+ 7	43.4	-0.9990	0.5841	-43	-90
2555	7.5	17	45	02.60	18	05	26.7		2	54.3	+ 9	03.3	-0.6110	0.5837	-17	-81
2571	6.9	17	49	22.47	19	30	45.2		4	43.5	+10	48.5	+0.8792	0.5829	+71	+17
2573	7.3	17	49	53.82	-19	06	35.8		4	56.7	+11	01.2	+0.4649	0.5828	+46	- 8

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

SEPTEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels		
		h	m	s	°	'	"	d	h	m	h	m				°	°
2578	6.4	17	53	29.69	-18	47	39.0	20	6	27.7	-11	31.3	+0.1588	0.5823	+0.0152	+26	-26
2596	7.3	17	59	26.75	19	06	15.2		8	58.5	- 9	06.0	+0.5251	0.5814	0.0200	+51	- 5
2606	7.1	18	00	57.95	17	36	34.1		9	37.1	- 8	28.8	-1.0136	0.5811	0.0212	-43	-90
2640	6.1	18	13	05.83	18	40	23.9		14	46.4	- 3	30.8	+0.2259	0.5791	0.0309	+31	-22
2646	6.0	18	14	48.07	17	23	13.1		15	30.0	- 2	48.7	-1.0912	0.5788	0.0322	-48	-90
2647	6.4	18	15	03.82	-18	28	37.5	15	36.7	- 2	42.3	+0.0481	0.5787	+0.0324	+21	-32	
2649	6.6	18	15	26.02	18	48	45.3		15	46.2	- 2	33.1	+0.4028	0.5787	0.0327	+43	-12
2653	6.4	18	16	18.41	18	38	03.6		16	08.6	- 2	11.6	+0.2295	0.5785	0.0334	+32	-22
2658	5.4-6.2	18	18	57.90	18	52	39.0		17	16.8	- 1	05.8	+0.5224	0.5781	0.0355	+52	- 5
2674	6.0	18	25	32.57	17	49	27.5		20	06.1	+ 1	37.3	-0.4691	0.5768	0.0407	- 6	-66
2680	5.8	18	27	46.87	-18	45	15.0	21	03.8	+ 2	33.0	+0.5422	0.5764	+0.0424	+54	- 4	
2685	7.0	18	28	54.37	18	56	02.5		21	32.9	+ 3	01.0	+0.7511	0.5762	0.0433	+72	+ 9
2686	5.2	18	29	01.79	18	25	47.7		21	36.1	+ 3	04.1	+0.2266	0.5762	0.0434	+33	-22
2687	6.5-7.3	18	29	28.08	19	09	11.3		21	47.4	+ 3	15.0	+0.9908	0.5761	0.0437	+71	+26
2690	7.0	18	30	45.69	18	23	50.7		22	20.9	+ 3	47.3	+0.2255	0.5758	0.0447	+33	-22
2699	7.2	18	32	58.24	-19	17	58.6	23	18.1	+ 4	42.4	+1.2130	0.5755	+0.0464	+71	+49	
2705	6.8	18	35	28.41	17	15	54.0		0	23.0	+ 5	45.0	-0.8648	0.5750	0.0484	-29	-90
2722	7.1	18	43	13.68	17	35	10.6		3	44.8	+ 8	59.6	-0.3566	0.5735	0.0543	+ 1	-58
2731	6.5	18	46	21.00	18	38	44.6		5	06.4	+10	18.3	+0.8303	0.5729	0.0566	+72	+14
2737	6.8	18	48	57.03	17	12	04.8		6	14.4	+11	24.0	-0.6204	0.5724	0.0586	-13	-81
2745	6.9	18	50	42.18	-18	41	07.0	7	00.4	-11	51.7	+0.9835	0.5720	+0.0599	+72	+25	
2755	6.6	18	53	50.02	18	45	39.8		8	22.6	-10	32.4	+1.1476	0.5714	0.0623	+72	+40
2764	6.3	18	57	02.67	18	37	16.1		9	47.1	- 9	10.9	+1.0906	0.5708	0.0646	+72	+34
2786	6.0	19	04	30.57	16	17	27.7		13	04.4	- 6	00.5	-1.1411	0.5692	0.0701	-49	-90
2789	7.3	19	04	55.97	17	18	15.6		13	15.6	- 5	49.7	-0.0602	0.5691	0.0704	+19	-39
2808	7.4	19	12	28.24	-17	24	58.9	16	36.0	- 2	36.3	+0.3024	0.5675	+0.0758	+41	-18	
2812	7.5	19	13	04.89	16	10	08.3		16	52.3	- 2	20.5	-0.9939	0.5674	0.0763	-35	-90
2815	7.1	19	15	18.82	16	02	20.3		17	51.9	- 1	23.0	-1.0551	0.5669	0.0778	-40	-90
2820	7.2	19	16	48.64	15	58	54.6		18	31.9	- 0	44.4	-1.0636	0.5666	0.0789	-41	-90
2826	4.0	19	19	17.64	17	55	24.8		19	38.4	+ 0	19.8	+1.0771	0.5661	0.0806	+73	+32
2827	4.6	19	19	22.69	-16	01	51.4	19	40.7	+ 0	22.0	-0.9208	0.5661	+0.0807	-30	-90	
2830	6.9	19	21	26.85	17	16	24.7		20	36.2	+ 1	15.6	+0.4685	0.5656	0.0821	+52	- 9
2856	6.6-7.6	19	31	58.01	16	27	43.3		1	19.8	+ 5	49.5	+0.0153	0.5633	0.0894	+25	-34
2871	7.1	19	36	51.62	17	00	02.1		3	32.6	+ 7	57.7	+0.7884	0.5623	0.0927	+73	+11
2874	6.8	19	37	32.63	15	15	35.2		3	51.2	+ 8	15.6	-1.0304	0.5621	0.0932	-37	-90
2876	5.4	19	38	22.51	-16	23	10.1	4	13.8	+ 8	37.5	+0.2004	0.5619	+0.0937	+36	-24	
2880	5.1	19	40	10.47	16	13	08.6		5	02.8	+ 9	24.8	+0.1001	0.5615	0.0949	+30	-29
2883	5.5	19	41	13.32	15	33	50.2		5	31.3	+ 9	52.4	-0.5505	0.5613	0.0956	- 5	-73
2900	6.8	19	49	22.92	14	52	48.1		9	14.7	-10	31.8	-0.9132	0.5595	0.1009	-27	-90
2905	6.4	19	50	47.72	14	42	24.7		9	53.5	- 9	54.3	-1.0322	0.5592	0.1018	-36	-90
2913	5.0	19	55	37.65	-15	35	57.0	12	06.6	- 7	45.6	+0.1470	0.5581	+0.1049	+34	-27	
2927	7.2	20	01	14.29	15	31	36.8		14	41.8	- 5	15.6	+0.3461	0.5569	0.1084	+47	-15
2936	6.8	20	06	10.63	15	08	53.9		16	59.1	- 3	02.9	+0.1937	0.5558	0.1114	+38	-24
2968	6.2	20	18	28.56	14	54	47.4		22	43.3	+ 2	30.0	+0.6035	0.5531	0.1187	+67	- 1
2969	3.2	20	18	42.73	14	54	35.2		22	50.0	+ 2	36.4	+0.6131	0.5530	0.1188	+68	0
2972	6.7	20	21	08.91	-14	23	12.6	23	58.6	+ 3	42.8	+0.1899	0.5525	+0.1202	+39	-24	
2975	7.0	20	21	56.81	14	14	40.7		0	21.1	+ 4	04.5	+0.0828	0.5523	0.1207	+32	-30
3002	6.2	20	31	55.07	13	51	38.7		5	03.6	+ 8	37.8	+0.2528	0.5501	0.1262	+43	-21
3006	7.0	20	34	01.08	12	31	18.5		6	03.4	+ 9	35.7	-1.0587	0.5496	0.1274	-35	-90
3045	6.0	20	48	26.58	12	41	44.4		12	56.9	- 7	44.0	+0.0309	0.5466	0.1349	+31	-33
3051	7.0	20	50	15.68	-13	21	20.5	13	49.4	- 6	53.3	+0.8604	0.5462	+0.1358	+77	+15	
3054	6.4	20	50	51.45	11	43	38.6		14	06.6	- 6	36.6	-0.8550	0.5460	0.1361	-19	-90
3065	7.5	20	55	47.83	12	06	41.5		16	29.6	- 4	18.1	-0.1141	0.5450	0.1385	+23	-42
3070	6.6	20	57	40.05	13	12	35.3		17	23.9	- 3	25.5	+1.1965	0.5446	0.1394	+77	+43
3075	7.1	20	59	46.13	-11	51	20.2		18	25.1	- 2	26.4	-0.1221	0.5442	+0.1404	+23	-42

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

SEPTEMBER-OCTOBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
3093	4.5	21	07	22.10	-11	32	11.2	23	22	06.9	+ 1	08.5	+0 0586	0.5426	+0.1439	+34	-32
3104	6.5	21	12	04.15	10	46	24.2	24	0	24.8	+ 3	22.1	-0.4335	0.5417	0.1460	+ 7	-63
3111	6.8	21	14	46.03	10	18	16.2		1	44.1	+ 4	38.9	-0.7473	0.5412	0.1471	-11	-90
3128	6.2	21	20	44.92	9	29	33.2		4	40.7	+ 7	30.0	-1.1909	0.5400	0.1497	-44	-90
3133	5.8	21	23	01.37	9	55	18.1		5	48.0	+ 8	35.2	-0.5578	0.5395	0.1505	+ 1	-73
3154	7.4	21	29	23.32	- 9	55	20.6		8	57.1	+11	38.5	-0.0788	0.5383	+0.1531	+27	-40
3163	7.3	21	34	43.53	10	21	23.7		11	36.3	- 9	47.2	+0.8017	0.5373	0.1551	+80	+10
3184	7.1	21	42	44.66	9	13	23.6		15	36.7	- 5	54.3	+0.1979	0.5359	0.1580	+44	-24
3185	5.3	21	42	49.65	9	16	09.5		15	39.2	- 5	51.8	+0.2546	0.5359	0.1580	+47	-21
3187	6.2	21	44	05.60	9	27	48.9		16	17.2	- 5	14.9	+0.5664	0.5357	0.1584	+69	- 4
3199	6.8	21	48	24.98	- 9	10	19.1		18	27.5	- 3	08.7	+0.5950	0.5350	+0.1599	+72	- 2
3212	7.5	21	54	04.74	7	10	21.9		21	18.7	- 0	22.6	-1.1235	0.5340	0.1617	-36	-90
3216	6.6	21	55	29.49	8	45	28.8		22	01.5	+ 0	18.9	+0.7193	0.5338	0.1622	+82	+ 5
3229	5.6	22	01	07.67	6	43	08.6	25	0	52.6	+ 3	04.9	-1.0386	0.5329	0.1639	-28	-90
3272	5.8	22	14	58.75	5	35	24.8		7	55.9	+ 9	55.4	-1.1042	0.5308	0.1676	-33	-90
3287	5.8	22	21	59.40	- 5	02	34.0		11	31.4	-10	35.5	-1.0991	0.5299	+0.1692	-32	-90
3320	5.3	22	35	38.67	4	26	16.2		18	33.5	- 3	45.9	-0.5628	0.5281	0.1720	+ 3	-73
3326	6.4	22	38	41.35	3	45	57.2		20	08.0	- 2	14.1	-1.0286	0.5278	0.1725	-26	-90
3370	6.2	22	56	09.51	2	36	45.9	26	5	12.8	+ 6	34.6	-0.7185	0.5259	0.1750	- 5	-90
3467	6.5	23	29	52.08	- 1	18	38.2		22	53.6	- 0	15.3	+0.9638	0.5235	0.1769	+89	+21
136	6.3	0	57	42.91	+ 6	15	47.9	28	21	17.7	- 3	11.5	+0.5957	0.5239	+0.1644	+76	- 1
146	4.4	1	00	49.65	7	40	14.6		22	55.9	- 1	36.1	-0.6988	0.5241	0.1635	- 4	-82
180	5.6	1	11	36.04	7	21	35.4	29	4	35.3	+ 3	53.4	+0.5619	0.5248	0.1601	+73	- 2
181	6.5	1	11	37.54	7	21	45.4		4	36.0	+ 3	54.2	+0.5609	0.5248	0.1601	+73	- 2
272	5.9	1	48	42.07	10	50	28.9		23	55.0	- 1	20.8	-0.3388	0.5280	0.1462	+16	-51
290	6.1	1	57	14.78	+12	05	48.9	30	4	19.8	+ 2	56.2	-1.0969	0.5288	+0.1425	-32	-78
422	5.5	2	49	14.26	14	54	49.4	1	6	48.0	+ 4	36.8	-0.7889	0.5352	0.1158	-10	-76
523	6.5	3	35	30.11	15	17	46.8	2	5	45.2	+ 2	51.4	+1.1262	0.5414	0.0873	+90	+45
527	6.3	3	37	06.95	16	24	12.9		6	32.6	+ 3	37.4	-0.0292	0.5417	0.0862	+33	-26
577	6.0	3	50	49.64	17	12	18.6		13	13.7	+10	05.8	-0.3686	0.5436	0.0770	+14	-45
590	6.3	3	58	16.61	+17	10	52.2		16	50.3	-10	24.4	-0.0732	0.5446	+0.0718	+31	-27
593	5.8	3	58	27.31	18	04	42.6		16	55.5	-10	19.4	-1.0564	0.5446	0.0717	-31	-72
610	6.2	4	05	38.80	17	13	49.6		20	23.8	- 6	57.7	+0.1190	0.5456	0.0667	+42	-16
620	6.3	4	10	10.50	17	10	19.7		22	34.6	- 4	51.1	+0.3249	0.5462	0.0635	+55	- 4
639	6.0	4	18	02.35	18	38	39.9	3	2	20.9	- 1	12.0	-1.0658	0.5472	0.0579	-32	-72
648	3.9	4	20	34.41	+17	26	47.3		3	33.6	- 0	01.6	+0.3206	0.5476	+0.0560	+55	- 3
653	4.8	4	21	44.15	17	20	56.6		4	07.0	+ 0	30.7	+0.4585	0.5477	0.0552	+65	+ 4
658	4.2	4	23	07.23	17	50	03.9		4	46.6	+ 1	09.1	-0.0388	0.5479	0.0542	+33	-23
684	6.2	4	31	10.69	17	55	49.0		8	37.0	+ 4	52.0	+0.0527	0.5490	0.0483	+38	-17
718	6.1	4	43	53.26	18	39	38.2		14	38.4	+10	41.7	-0.4849	0.5506	0.0389	+ 7	-50
730	5.1	4	48	58.64	+18	46	12.0		17	02.5	-10	58.9	-0.5154	0.5512	+0.0351	+ 6	-52
736	6.2	4	52	33.82	19	25	07.9		18	43.8	- 9	20.9	-1.1678	0.5516	0.0324	-43	-71
764	5.0	5	05	01.62	18	35	24.1	4	0	34.6	- 3	41.6	-0.0990	0.5531	0.0229	+29	-23
814	5.3	5	24	46.50	17	55	36.6		9	46.5	+ 5	12.0	+0.7636	0.5553	0.0078	+90	+27
832	4.7	5	29	48.44	18	33	49.9		12	06.4	+ 7	27.3	+0.0846	0.5559	0.0039	+40	-11
836	5.5	5	31	07.35	+18	30	39.6		12	42.9	+ 8	02.6	+0.1440	0.5560	+0.0029	+44	- 8
878	5.5	5	45	02.58	17	42	49.4		19	08.2	- 9	45.0	+0.9905	0.5575	-0.0080	+90	+42
934	6.4	6	08	37.58	18	08	18.6	5	5	56.5	+ 0	41.5	+0.3430	0.5597	0.0263	+57	+ 1
943	6.2	6	11	08.43	18	41	27.9		7	05.3	+ 1	47.9	-0.2833	0.5599	0.0283	+19	-35
944	5.7	6	12	04.66	17	55	04.8		7	30.9	+ 2	12.7	+0.5364	0.5600	0.0291	+72	+11
947	5.2	6	12	25.86	+19	10	13.1		7	40.6	+ 2	22.0	-0.8157	0.5600	-0.0293	-13	-71
961	6.2	6	16	38.49	17	20	28.2		9	35.6	+ 4	13.2	+1.0917	0.5604	0.0326	+90	+48
970	6.5	6	19	02.10	17	46	57.0		10	40.9	+ 5	16.3	+0.5806	0.5606	0.0344	+77	+13
1029	5.1	6	40	00.67	17	41	08.0		20	11.5	- 9	32.6	+0.2773	0.5623	0.0507	+52	- 5
1040	6.2	6	44	59.28	+18	14	16.3		22	26.3	- 7	22.3	-0.4305	0.5626	-0.0545	+10	-47

Full Moon—Sept. 27^d 21^h 43^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

OCTOBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
1072	6.2	7 00	01.95		+17 48	50.5		6 5	13.0		- 0	49.6	-0.3857	0.5637	-0.0659	+13	-45
1073	6.0	7 00	10.88		16 44	00.7		5 17	0		- 0	45.7	+0.7583	0.5637	0.0660	+90	+21
1096	5.3	7 11	00.48		16 13	43.9		10 08	7		+ 3	56.0	+0.9503	0.5645	0.0742	+90	+32
1106	3.6	7 15	43.66		16 36	52.7		12 15	7		+ 5	58.5	+0.3803	0.5648	0.0777	+59	- 2
1141	5.6	7 29	25.92		17 10	24.5		18 23	5		+11	53.7	-0.7167	0.5656	0.0878	- 6	-73
1147	5.1	7 31	15.45		+15 54	55.3		19 12	5		-11	19.1	+0.5371	0.5657	-0.0891	+72	+ 5
1197	6.0	7 54	39.04		15 54	01.3		7 5	37.9		- 1	15.3	-0.4632	0.5670	0.1057	+ 9	-54
1231	6.3	8 06	24.18		13 45	39.9		10 51	1		+ 3	47.0	+1.1974	0.5676	0.1137	+90	+50
1234	6.1	8 08	39.91		14 45	05.8		11 51	3		+ 4	45.2	+0.0496	0.5678	0.1152	+38	-24
1237	6.4	8 10	03.73		14 07	39.0		12 28	5		+ 5	21.0	+0.6280	0.5679	0.1162	+81	+ 8
1271	5.9	8 26	19.20		+14 20	50.9		19 40	5		-11	42.0	-0.4757	0.5688	-0.1268	+ 8	-58
1281	6.4	8 31	27.88		13 23	54.5		21 57	0		- 9	30.4	+0.2153	0.5690	0.1300	+48	-16
1309	5.7	8 40	55.89		12 49	44.2		8 2	07.8		- 5	28.3	+0.2474	0.5695	0.1359	+50	-15
1318	5.7	8 44	40.23		12 15	41.4		3 46	7		+ 3	52.8	+0.6062	0.5698	0.1381	+78	+ 4
1332	5.7	8 53	40.25		11 47	02.3		7 44	7		- 0	03.2	+0.5379	0.5702	0.1434	+71	0
1341	4.3	8 56	13.71		+12 01	03.7		8 52	2		+ 1	02.0	+0.1352	0.5704	-0.1448	+43	-22
1359	5.1	9 05	30.56		10 50	04.5		12 57	1		+ 4	58.2	+0.7455	0.5709	0.1501	+90	+11
1364	6.5	9 07	31.67		11 43	57.1		13 50	3		+ 5	49.6	-0.3076	0.5710	0.1511	+18	-48
1381	6.3	9 15	36.85		11 40	26.9		17 23	3		+ 9	15.0	-0.7908	0.5715	0.1555	-10	-79
1397	5.5	9 26	14.57		9 14	12.8		22 02	8		-10	15.4	+0.9569	0.5721	0.1609	+90	+24
1410	5.3	9 29	44.61		+ 9 53	53.2		23 34	7		- 8	46.7	+0.0359	0.5723	-0.1626	+37	-30
1428	3.8	9 38	56.59		10 04	49.3		9 3	36.0		- 4	54.0	-0.8108	0.5729	0.1669	-11	-80
1458	5.9	9 54	14.32		9 07	44.6		10 16	1		+ 1	32.0	-0.9799	0.5740	0.1735	-22	-81
1465	6.3	9 55	56.07		8 30	41.1		11 00	4		+ 2	14.7	-0.4844	0.5741	0.1742	+ 8	-63
1468	4.9	9 58	01.59		8 14	33.7		11 55	0		+ 3	07.4	-0.3720	0.5742	0.1751	+14	-55
1518	6.3	10 20	50.41		+ 6 45	10.0		21 48	8		-11	20.0	-0.6452	0.5761	-0.1833	- 1	-79
1519	6.5	10 21	05.57		5 54	15.7		21 55	4		-11	13.7	+0.1853	0.5761	0.1833	+46	-23
1565	6.3	10 41	11.84		4 57	54.6		10 6	35.8		- 2	51.9	-0.4909	0.5778	0.1890	+ 8	-66
1599	5.0	10 58	25.17		3 50	24.1		13 59	3		+ 4	15.5	-0.7799	0.5795	0.1928	- 9	-87
1611	5.7	11 04	47.30		2 10	50.1		16 42	7		+ 6	53.0	+0.3415	0.5801	0.1938	+56	-16
1635	5.4	11 15	09.30		+ 2 14	18.5		21 07	9		+11	08.6	-0.5758	0.5812	-0.1953	+ 3	-74
1637	6.0	11 16	47.18		+ 1 52	39.8		21 49	6		+11	48.8	-0.3542	0.5813	0.1955	+16	-57
2159	5.3	15 04	18.62		-16 05	44.1		14 18	35.1		+ 5	02.0	+1.1219	0.6047	0.1203	+74	+36
2170	6.8	15 09	30.76		16 00	07.4		20 37	8		+ 6	59.8	+0.7883	0.6049	0.1166	+74	+10
2193	6.1	15 18	42.14		15 23	53.9		15 0	14.3		+10	27.7	-0.2156	0.6051	0.1100	+14	-48
2196	6.7	15 20	42.87		-14 59	07.5		1 01	7		+11	13.2	-0.7095	0.6052	-0.1085	-14	-90
2208	7.4	15 25	22.91		14 48	32.4		2 51	6		-11	01.2	-1.0800	0.6052	0.1051	-40	-90
2209	5.9	15 25	54.97		16 34	17.1		3 04	2		-10	49.2	+0.6388	0.6052	0.1047	+68	+ 1
2210	6.8	15 26	18.97		15 33	24.9		3 13	6		-10	40.1	-0.3797	0.6052	0.1044	+ 4	-59
2213	5.9	15 28	19.95		16 28	00.2		4 01	1		- 9	54.5	+0.4372	0.6052	0.1029	+52	-10
2218	5.6	15 30	34.55		-16 42	41.8		4 53	9		- 9	03.9	+0.5897	0.6053	-0.1012	+63	- 2
2232	7.2	15 36	19.90		17 31	42.2		7 09	3		- 6	53.8	+1.1749	0.6053	0.0968	+73	+42
2246	7.4	15 41	35.96		16 44	14.1		9 13	3		- 4	54.7	+0.1964	0.6052	0.0928	+35	-24
2247	5.6	15 41	44.37		15 32	24.4		9 16	6		- 4	51.6	-0.9944	0.6052	0.0927	-35	-90
2259	6.7	15 47	29.94		17 46	29.3		11 32	1		- 2	41.4	+1.0159	0.6052	0.0882	+73	+27
2271	4.3	15 51	27.83		-16 36	25.6		13 05	4		- 1	11.8	-0.2769	0.6050	-0.0851	+ 8	-52
2280	6.8	15 54	44.29		15 54	47.2		14 22	5		+ 0	02.2	-1.0739	0.6049	0.0825	-42	-90
2291	5.5	15 57	59.93		16 24	38.6		15 39	3		+ 1	16.0	-0.6841	0.6049	0.0799	-15	-90
2301	6.8	16 02	39.59		18 25	30.4		17 29	1		+ 3	01.4	+1.1756	0.6047	0.0762	+72	+43
2313	7.0	16 05	43.80		18 07	49.1		18 41	5		+ 4	10.9	+0.7925	0.6045	0.0738	+72	+11
2316	6.4	16 07	31.99		-18 13	48.9		19 24	0		+ 4	51.7	+0.8405	0.6045	-0.0723	+72	+14
2331	6.4	16 12	15.71		18 25	43.4		21 15	5		+ 6	38.8	+0.9082	0.6042	0.0685	+72	+19
2341	7.2	16 16	04.20		17 17	06.8		22 45	4		+ 8	05.1	-0.3318	0.6039	0.0654	+ 3	-56
2345	6.9	16 17	10.90		18 43	37.2		23 11	6		+ 8	30.3	+1.0780	0.6039	0.0645	+72	+33
2352	6.7	16 20	30.91		-16 55	15.5		16 0	30.3		+ 9	45.9	-0.8071	0.6037	-0.0618	-24	-90

New Moon—Oct. 12^d 20^h 52^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

OCTOBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
2361	4.8	16	24	37.32	-18	21	42.1	16	2	07.4	+11	19.2	+0.5345	0.6034	-0.0584	+55	- 5
2390	6.7	16	36	04.50	18	08	11.3		6	38.6	- 8	20.4	+0.0673	0.6025	0.0489	+24	-31
2391	7.1	16	36	09.92	18	44	31.0		6	40.7	- 8	18.4	+0.6720	0.6025	0.0489	+67	+ 4
2396	6.6	16	38	54.51	17	58	41.3		7	45.8	- 7	15.8	-0.1450	0.6022	0.0466	+12	-44
2399	5.0	16	39	10.67	17	39	40.7		7	52.2	- 7	09.7	-0.4675	0.6022	0.0464	- 6	-66
2408	6.9	16	43	04.90	-19	03	35.7		9	24.9	- 5	40.7	+0.8662	0.6018	-0.0432	+71	+16
2436	6.3	16	54	38.06	19	28	25.2		13	59.8	- 1	16.5	+1.1088	0.6006	0.0335	+71	+36
2441	6.5	16	57	19.71	18	11	00.4		15	04.1	- 0	14.7	-0.2242	0.6003	0.0313	+ 6	-49
2448	6.4	16	59	25.97	18	49	26.6		15	54.4	+ 0	33.6	+0.3956	0.6001	0.0295	+42	-12
2454	7.2	17	02	05.38	17	25	55.1		16	57.9	+ 1	34.6	-1.0374	0.5996	0.0273	-44	-90
2460	6.1	17	05	50.71	-17	33	12.0		18	27.8	+ 3	01.0	-0.9545	0.5992	-0.0242	-38	-90
2463	6.9	17	07	48.92	19	22	58.1		19	15.0	+ 3	46.3	+0.8733	0.5989	0.0225	+71	+17
2485	7.4	17	14	19.67	17	52	02.8		21	51.3	+ 6	16.6	-0.7090	0.5980	0.0170	-23	-90
2495	6.0	17	17	28.88	17	42	44.6		23	07.2	+ 7	29.5	-0.8864	0.5976	0.0144	-34	-90
2497	6.6	17	18	08.56	19	17	20.0		23	23.1	+ 7	44.8	+0.7052	0.5975	0.0139	+68	+ 6
2508	6.3	17	22	11.78	-18	24	24.1	17	1	00.8	+ 9	18.7	-0.2077	0.5968	-0.0105	+ 5	-48
2531	7.3	17	34	36.06	18	57	52.5		6	01.1	- 9	52.6	+0.3320	0.5948	-0.0002	+35	-16
2548	7.5	17	41	44.32	17	43	27.2		8	54.8	- 7	05.5	-0.9224	0.5936	+0.0057	-37	-90
2555	7.5	17	45	02.11	18	05	26.5		10	15.3	- 5	48.1	-0.5402	0.5929	0.0084	-13	-73
2571	6.9	17	49	21.97	19	30	44.9		12	01.2	- 4	06.2	+0.9280	0.5921	0.0120	+71	+21
2573	7.3	17	49	53.32	-19	06	35.5		12	14.0	- 3	53.9	+0.5199	0.5920	+0.0124	+50	- 5
2578	6.4	17	53	29.19	18	47	38.8		13	42.3	- 2	29.0	+0.2183	0.5914	0.0154	+29	-22
2596	7.3	17	59	26.25	19	06	15.1		16	08.7	- 0	08.1	+0.5794	0.5902	0.0202	+56	- 2
2606	7.1	18	00	57.45	17	36	34.0		16	46.2	+ 0	28.0	-0.9373	0.5899	0.0214	-37	-90
2640	6.1	18	13	05.33	18	40	23.9		21	46.9	+ 5	17.4	+0.2846	0.5873	0.0313	+35	-19
2646	6.0	18	14	47.57	-17	23	13.1		22	29.4	+ 5	58.2	-1.0144	0.5869	+0.0326	-42	-90
2647	6.4	18	15	03.32	18	28	37.5		22	35.9	+ 6	04.5	+0.1092	0.5869	0.0328	+25	-29
2649	6.6	18	15	25.51	18	48	45.3		22	45.1	+ 6	13.4	+0.4591	0.5868	0.0331	+47	- 9
2653	6.4	18	16	17.90	18	38	03.7		23	06.9	+ 6	34.4	+0.2882	0.5865	0.0338	+36	-18
2658	5.4-6.2	18	18	57.39	18	52	39.1	18	0	13.3	+ 7	38.3	+0.5771	0.5860	0.0359	+57	- 2
2674	6.0	18	25	32.06	-17	49	27.6		2	58.1	+10	17.0	-0.4013	0.5845	+0.0411	- 3	-61
2680	5.8	18	27	46.36	18	45	15.1		3	54.4	+11	11.2	+0.5967	0.5840	0.0429	+59	- 1
2685	7.0	18	28	53.86	18	56	02.6		4	22.7	+11	38.4	+0.8028	0.5837	0.0437	+72	+12
2686	5.2	18	29	01.28	18	25	47.8		4	25.8	+11	41.4	+0.2851	0.5837	0.0438	+36	-19
2687	6.5-7.3	18	29	27.56	19	09	11.4		4	36.9	+11	52.1	+1.0394	0.5836	0.0442	+71	+30
2690	7.0	18	30	45.18	-18	23	50.9		5	09.5	-11	36.5	+0.2841	0.5833	+0.0452	+36	-19
2695	7.0	18	32	44.43	17	00	59.4		5	59.7	-10	48.2	-1.1033	0.5828	0.0468	-48	-90
2705	6.8	18	35	27.91	17	15	54.2		7	08.6	- 9	41.8	-0.7924	0.5822	0.0488	-25	-90
2722	7.1	18	43	13.18	17	35	10.9		10	25.5	- 6	32.1	-0.2911	0.5803	0.0547	+ 5	-53
2731	6.5	18	46	20.49	18	38	44.9		11	45.2	- 5	15.4	+0.8812	0.5795	0.0572	+72	+17
2737	6.8	18	48	56.52	-17	12	05.1		12	51.7	- 4	11.3	-0.5520	0.5789	+0.0591	- 9	-74
2745	6.9	18	50	41.67	18	41	07.4		13	36.6	- 3	28.0	+1.0325	0.5784	0.0605	+72	+29
2755	6.6	18	53	49.51	18	45	40.2		14	56.9	- 2	10.5	+1.1947	0.5776	0.0627	+72	+46
2764	6.3	18	57	02.16	18	37	16.5		16	19.6	- 0	50.9	+1.1385	0.5768	0.0651	+72	+39
2786	6.0	19	04	30.07	16	17	28.2		19	32.7	+ 2	15.3	-1.0681	0.5749	0.0706	-42	-90
2789	7.3	19	04	55.46	-17	18	16.1		19	43.7	+ 2	25.9	+0.0006	0.5748	+0.0709	+22	-35
2808	7.4	19	12	27.74	17	24	59.5		23	00.1	+ 5	35.3	+0.3588	0.5728	0.0763	+44	-15
2812	7.5	19	13	04.39	16	10	08.8		23	16.0	+ 5	50.7	-0.9235	0.5726	0.0768	-30	-90
2815	7.1	19	15	18.32	16	02	20.8	19	0	14.5	+ 6	47.0	-0.9844	0.5721	0.0783	-35	-90
2820	7.2	19	16	48.15	15	58	55.1		0	53.7	+ 7	24.9	-0.9929	0.5717	0.0794	-35	-90
2826	4.0	19	19	17.14	-17	55	25.4		1	59.0	+ 8	27.9	+1.1252	0.5710	+0.0811	+73	+37
2827	4.6	19	19	22.20	16	01	52.0		2	01.2	+ 8	30.0	-0.8519	0.5710	0.0812	-25	-90
2830	6.9	19	21	26.35	17	16	25.3		2	55.7	+ 9	22.6	+0.5228	0.5705	0.0827	+57	- 5
2856	6.6-7.6	19	31	57.52	16	27	43.9		7	34.3	-10	08.6	+0.0735	0.5676	0.0899	+28	-31
2871	7.1	19	36	51.14	-17	00	02.8		9	44.9	- 8	02.6	+0.8390	0.5663	+0.0932	+73	+14

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

OCTOBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	''	d	h	m	h	m				°	'
2874	6.8	19	37	32.15	-15	15	35.9	19	10	03.1	- 7	44.9	-0.9629	0.5660	+0.0936	-31	-90
2876	5.4	19	38	22.03	16	23	10.8		10	25.4	- 7	23.4	+0.2564	0.5658	0.0941	+40	-20
2880	5.1	19	40	09.99	16	13	09.4		11	13.6	- 6	36.9	+0.1569	0.5654	0.0953	+34	-26
2883	5.5	19	41	12.84	15	33	50.9		11	41.7	- 6	09.7	-0.4879	0.5651	0.0960	- 2	-68
2900	6.8	19	49	22.45	14	52	48.9		15	21.8	- 2	37.3	-0.8484	0.5629	0.1012	-23	-90
2905	6.4	19	50	47.25	-14	42	25.4		16	00.0	- 2	00.3	-0.9666	0.5625	+0.1022	-31	-90
2913	5.0	19	55	37.17	15	35	57.9		18	11.3	+ 0	06.5	+0.2021	0.5611	0.1051	+37	-23
2927	7.2	20	01	13.82	15	31	37.7		20	44.5	+ 2	34.6	+0.3991	0.5596	0.1087	+50	-12
2936	6.8	20	06	10.17	15	08	54.8		23	00.1	+ 4	45.6	+0.2474	0.5583	0.1116	+41	-21
2951	7.1	20	12	49.62	13	30	25.7	20	2	03.9	+ 7	43.2	-1.1466	0.5565	0.1155	-44	-90
2968	6.2	20	18	28.11	-14	54	48.4		4	40.6	+10	14.7	+0.6532	0.5549	+0.1188	+71	+ 2
2969	3.2	20	18	42.28	14	54	36.2		4	47.2	+10	21.1	+0.6627	0.5548	0.1189	+72	+ 2
2972	6.7	20	21	08.46	14	23	13.6		5	55.1	+11	26.8	+0.2422	0.5543	0.1203	+42	-21
2975	7.0	20	21	56.36	14	14	41.7		6	17.4	+11	48.3	+0.1357	0.5540	0.1207	+35	-27
2992	7.5	20	27	13.93	12	43	36.7		8	45.7	- 9	48.3	-1.1797	0.5526	0.1237	-47	-90
3001	7.0	20	31	46.03	-12	28	57.0		10	53.4	- 7	44.8	-1.1760	0.5514	+0.1261	-46	-90
3002	6.2	20	31	54.63	13	51	39.7		10	57.5	- 7	40.9	+0.3035	0.5513	0.1262	+46	-18
3006	7.0	20	34	00.65	12	31	19.4		11	56.8	- 6	43.5	-1.0005	0.5508	0.1273	-30	-90
3045	6.0	20	48	26.17	12	41	45.5		18	47.5	- 0	06.0	+0.0808	0.5470	0.1346	+34	-30
3051	7.0	20	50	15.27	13	21	21.6		19	39.7	+ 0	44.5	+0.9059	0.5466	0.1355	+77	+18
3054	6.4	20	50	51.04	-11	43	39.5		19	56.9	+ 1	01.1	-0.8011	0.5464	+0.1359	-15	-90
3065	7.5	20	55	47.42	12	06	42.5		22	19.1	+ 3	18.8	-0.0646	0.5452	0.1382	+26	-39
3070	6.6	20	57	39.65	13	12	36.4		23	13.2	+ 4	11.1	+1.2398	0.5448	0.1391	+77	+48
3075	7.1	20	59	45.73	11	51	21.2	21	0	14.0	+ 5	10.0	-0.0732	0.5442	0.1400	+26	-39
3093	4.5	21	07	21.72	11	32	12.3		3	55.0	+ 8	44.0	+0.1057	0.5423	0.1434	+36	-29
3104	6.5	21	12	03.77	-10	46	25.3		6	12.5	+10	57.2	-0.3853	0.5413	+0.1455	+10	-59
3111	6.8	21	14	45.66	10	18	17.2		7	31.6	-11	46.2	-0.6984	0.5406	0.1466	- 8	-90
3125	6.9	21	19	46.75	9	30	02.8		9	59.4	- 9	23.0	-1.2035	0.5394	0.1487	-46	-90
3128	6.2	21	20	44.55	9	29	34.1		10	27.8	- 8	55.5	-1.1418	0.5392	0.1491	-39	-90
3133	5.8	21	23	01.01	9	55	19.1		11	35.0	- 7	50.4	-0.5111	0.5387	0.1500	+ 3	-69
3154	7.4	21	29	22.97	- 9	55	21.7		14	43.9	- 4	47.3	-0.0347	0.5373	+0.1525	+30	-37
3163	7.3	21	34	43.19	10	21	24.8		17	23.0	- 2	13.1	+0.8427	0.5362	0.1544	+80	+13
3184	7.1	21	42	44.34	9	13	24.6		21	23.5	+ 1	40.0	+0.2392	0.5345	0.1572	+46	-22
3185	5.3	21	42	49.33	9	16	10.6		21	26.0	+ 1	42.4	+0.2958	0.5345	0.1573	+50	-19
3187	6.2	21	44	05.28	9	27	49.9		22	04.0	+ 2	19.3	+0.6067	0.5342	0.1577	+73	- 1
3199	6.8	21	48	24.67	- 9	10	20.1	22	0	14.4	+ 4	25.7	+0.6347	0.5334	+0.1591	+76	0
3212	7.5	21	54	04.43	7	10	22.8		3	05.8	+ 7	12.0	-1.0818	0.5323	0.1608	-32	-90
3216	6.6	21	55	29.19	8	45	29.8		3	48.7	+ 7	53.5	+0.7578	0.5320	0.1613	+82	+ 7
3229	5.6	22	01	07.38	6	43	09.4		6	40.3	+10	39.9	-0.9986	0.5310	0.1629	-25	-90
3248	6.6	22	07	20.40	7	44	36.0		9	50.2	-10	15.8	+0.6357	0.5299	0.1646	+77	0
3259	7.4	22	10	34.30	- 6	40	13.4		11	29.3	- 8	39.7	-0.2620	0.5294	+0.1655	+19	-51
3272	5.8	22	14	58.48	5	35	25.5		13	44.6	- 6	28.4	-1.0671	0.5287	0.1666	-30	-90
3281	7.5	22	19	15.51	6	26	52.9		15	56.7	- 4	20.3	+0.2370	0.5280	0.1675	+48	-22
3287	5.8	22	21	59.15	5	02	34.7		17	20.9	- 2	58.6	-1.0634	0.5277	0.1681	-29	-90
3290	7.3	22	23	58.99	5	23	05.0		18	22.7	- 1	58.6	-0.5166	0.5274	0.1686	+ 5	-69
3320	5.3	22	35	38.45	- 4	26	16.8	23	0	24.7	+ 3	52.7	-0.5302	0.5258	+0.1709	+ 5	-70
3326	6.4	22	38	41.14	3	45	57.8		1	59.6	+ 5	24.9	-0.9964	0.5254	0.1714	-24	-90
3328	7.0	22	39	58.52	5	18	51.1		2	39.9	+ 6	03.9	+0.8163	0.5252	0.1715	+85	+11
3344	6.8	22	45	43.78	4	26	25.2		5	39.8	+ 8	58.6	+0.3739	0.5246	0.1724	+57	-14
3366	6.6	22	55	00.36	3	27	46.8		10	30.8	-10	18.9	+0.1403	0.5236	0.1737	+43	-27
3370	6.2	22	56	09.33	- 2	36	46.3		11	07.0	- 9	43.8	-0.6897	0.5235	+0.1738	- 4	-87
3411	7.2	23	12	00.38	2	51	23.0		19	27.0	- 1	38.2	+1.0335	0.5222	0.1752	+88	+26
3420	7.1	23	13	52.49	1	38	44.6		20	26.1	- 0	40.8	-0.1278	0.5221	0.1753	+28	-42
3460	7.1	23	27	24.80	1	15	35.9	24	3	35.4	+ 6	16.1	+0.7034	0.5214	0.1758	+88	+ 4
3467	6.5	23	29	51.98	- 1	18	38.5		4	53.3	+ 7	31.8	+0.9879	0.5212	+0.1758	+89	+23

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

OCTOBER–NOVEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>	<i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h m s	° ' "	d h m	h m	° °								
3494	4.6	23 39 57.95	+ 1 33 22.2	24 10 14.5	-11 16.3	-1.2385	0.5209	+0.1757	-45	-89				
3502	7.4	23 44 29.38	0 18 14.9	12 38.5	- 8 56.4	+0.5673	0.5209	0.1755	+73	- 4				
3507	6.4	23 46 44.11	1 59 18.8	13 50.0	- 7 46.9	-1.0866	0.5208	0.1754	-30	-89				
3508	5.8	23 47 22.20	0 51 00.3	14 10.2	- 7 27.3	+0.2318	0.5208	0.1754	+49	-22				
3515	6.2	23 50 59.45	1 51 51.7	16 05.6	- 5 35.2	-0.5533	0.5208	0.1752	+ 5	-72				
98	6.2	0 45 17.21	+ 6 31 07.2	25 20 54.0	- 1 36.3	-0.7622	0.5225	+0.1672	- 8	-84				
104	5.8	0 46 14.76	5 04 16.9	21 24.4	- 1 06.8	+0.9299	0.5226	0.1670	+90	+20				
136	6.3	0 57 43.03	6 15 48.6	26 3 27.7	+ 4 46.0	+0.6080	0.5234	0.1641	+77	0				
146	4.4	1 00 49.78	7 40 15.4	5 06.0	+ 6 21.5	-0.6875	0.5237	0.1632	- 3	-82				
180	5.6	1 11 36.20	7 21 36.2	10 45.7	+11 51.3	+0.5730	0.5246	0.1600	+74	- 1				
181	6.5	1 11 37.70	+ 7 21 46.2	10 46.5	+11 52.1	+0.5720	0.5246	+0.1600	+74	- 2				
422	5.5	2 49 14.68	14 54 50.7	28 12 53.6	-11 30.2	-0.7814	0.5371	0.1162	-10	-76				
523	6.5	3 35 30.65	15 17 47.8	29 11 46.2	+10 39.9	+1.1364	0.5435	0.0877	+90	+46				
527	6.3	3 37 07.49	16 24 14.0	12 33.5	+11 25.7	-0.0200	0.5438	0.0866	+34	-25				
577	6.0	3 50 50.22	17 12 19.7	19 13.5	- 6 06.9	-0.3591	0.5456	0.0774	+15	-45				
590	6.3	3 58 17.20	+17 10 53.1	22 49.7	- 2 37.6	-0.0629	0.5465	+0.0722	+31	-26				
593	5.8	3 58 27.90	18 04 43.6	22 54.8	- 2 32.6	-1.0476	0.5466	0.0721	-30	-72				
610	6.2	4 05 39.41	17 13 50.4	30 2 22.7	+ 0 48.7	+0.1300	0.5474	0.0670	+43	-15				
620	6.3	4 10 11.12	17 10 20.4	4 33.3	+ 2 55.1	+0.3366	0.5481	0.0638	+56	- 3				
639	6.0	4 18 02.99	18 38 40.7	8 19.3	+ 6 33.9	-1.0564	0.5489	0.0582	-31	-72				
648	3.9	4 20 35.04	+17 26 48.0	9 32.0	+ 7 44.2	+0.3331	0.5492	+0.0563	+56	- 3				
653	4.8	4 21 44.78	17 20 57.2	10 05.3	+ 8 16.4	+0.4714	0.5494	0.0555	+67	+ 5				
658	4.2	4 23 07.88	17 50 04.5	10 44.9	+ 8 54.8	-0.0269	0.5495	0.0545	+33	-22				
684	6.2	4 31 11.35	17 55 49.5	14 35.2	-11 22.4	+0.0654	0.5504	0.0486	+39	-17				
718	6.1	4 43 53.94	18 39 38.6	20 36.8	- 5 32.5	-0.4729	0.5517	0.0391	+ 8	-49				
730	5.1	4 48 59.33	+18 46 12.4	23 01.0	- 3 13.0	-0.5032	0.5522	+0.0353	+ 6	-51				
736	6.2	4 52 34.52	19 25 08.3	31 0 42.5	- 1 34.8	-1.1577	0.5526	0.0326	-42	-71				
764	5.0	5 05 02.34	18 35 24.2	6 34.2	+ 4 05.4	-0.0842	0.5537	0.0231	+30	-22				
814	5.3	5 24 47.25	17 55 36.3	15 48.3	-10 58.8	+0.7844	0.5552	0.0080	+90	+28				
832	4.7	5 29 49.20	18 33 49.5	18 08.9	- 8 42.8	+0.1024	0.5556	0.0041	+41	-10				
836	5.5	5 31 08.11	+18 30 39.3	18 45.7	- 8 07.2	+0.1623	0.5556	+0.0031	+45	- 7				
878	5.5	5 45 03.35	17 42 48.8	1 1 13.6	- 1 52.2	+1.0153	0.5565	-0.0078	+90	+44				
934	6.4	6 08 38.38	18 08 17.6	12 07.9	+ 8 40.3	+0.3666	0.5577	0.0260	+58	+ 2				
943	6.2	6 11 09.24	18 41 26.9	13 17.4	+ 9 47.6	-0.2641	0.5578	0.0280	+20	-34				
944	5.7	6 12 05.47	17 55 03.7	13 43.3	+10 12.6	+0.5618	0.5578	0.0287	+75	+13				
947	5.2	6 12 26.67	+19 10 12.1	13 53.1	+10 22.1	-0.8005	0.5578	-0.0290	-12	-71				
970	6.5	6 19 02.90	17 46 55.8	16 55.6	-10 41.5	+0.6073	0.5581	0.0341	+80	+15				
1029	5.1	6 40 01.49	17 41 06.5	2 2 34.1	- 1 22.5	+0.3040	0.5587	0.0501	+54	- 4				
1040	6.2	6 45 00.11	18 14 14.7	4 51.1	+ 0 50.0	-0.4101	0.5589	0.0540	+12	-46				
1072	6.2	7 00 02.78	17 48 48.6	11 44.8	+ 7 29.8	-0.3638	0.5592	0.0652	+14	-44				
1073	6.0	7 00 11.71	+16 43 58.7	11 48.9	+ 7 33.7	+0.7921	0.5592	-0.0654	+90	+23				
1096	5.3	7 11 01.31	16 13 41.8	16 46.3	-11 39.0	+0.9877	0.5593	0.0733	+90	+35				
1106	3.6	7 15 44.49	16 36 50.6	18 55.8	- 9 33.8	+0.4119	0.5594	0.0768	+62	0				
1141	5.6	7 29 26.76	17 10 22.1	3 1 11.7	- 3 30.6	-0.6968	0.5596	0.0866	- 5	-72				
1147	5.1	7 31 16.28	15 54 52.9	2 01.8	- 2 42.2	+0.5723	0.5596	0.0879	+75	+ 7				
1197	6.0	7 54 39.87	+15 53 58.5	12 42.7	+ 7 37.1	-0.4388	0.5598	-0.1041	+10	-53				
1234	6.1	8 08 40.73	14 45 02.8	19 06.3	-10 12.2	+0.0819	0.5599	0.1135	+40	-22				
1237	6.4	8 10 04.55	14 07 36.0	19 44.5	- 9 35.3	+0.6685	0.5599	0.1144	+87	+10				
1271	5.9	8 26 20.01	14 20 47.7	4 3 09.2	- 2 25.7	-0.4502	0.5601	0.1247	+10	-56				
1281	6.4	8 31 28.68	13 23 51.2	5 29.9	- 0 09.8	+0.2514	0.5602	0.1279	+50	-14				
1309	5.7	8 40 56.69	+12 49 40.8	9 48.6	+ 4 00.2	+0.2846	0.5602	-0.1336	+52	-13				
1318	5.7	8 44 41.03	12 15 38.0	11 30.7	+ 5 38.8	+0.6491	0.5604	0.1357	+83	+ 7				
1332	5.7	8 53 41.04	11 46 58.8	15 36.4	+ 9 36.2	+0.5803	0.5606	0.1409	+75	+ 2				
1341	4.3	8 56 14.49	12 01 00.2	16 46.2	+10 43.6	+0.1714	0.5606	0.1423	+45	-20				
1359	5.1	9 05 31.33	+10 50 01.0	20 59.3	- 9 11.8	+0.7917	0.5609	-0.1474	+90	+14				

Full Moon—Oct. 27^d 15^h 41^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

NOVEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
1364	6.5	9 07	32.44		+11 43	53.4		4 21	54.3		- 8 18.7		-0.2781	0.5610	-0.1484	+19	-47
1381	6.3	9 15	37.62		11 40	23.2		5 1	34.6		- 4 45.9		-0.7691	0.5612	0.1526	- 8	-79
1397	5.5	9 26	15.32		9 14	09.2		6 23.9			- 0 06.5		+1.0072	0.5616	0.1579	+90	+28
1410	5.3	9 29	45.35		9 53	49.5		7 59.1			+ 1 25.5		+0.0712	0.5618	0.1595	+39	-28
1428	3.8	9 38	57.33		10 04	45.5		12 08.9			+ 5 26.8		-0.7894	0.5622	0.1638	-10	-80
1458	5.9	9 54	15.03		+ 9 07	40.8		19 03.5			-11 52.8		-0.9615	0.5631	-0.1702	-21	-81
1465	6.3	9 55	56.78		8 30	37.3		19 49.4			-11 08.5		-0.4578	0.5632	0.1709	+10	-61
1468	4.9	9 58	02.29		8 14	29.9		20 46.0			-10 13.8		-0.3435	0.5633	0.1718	+16	-53
1518	6.3	10 20	51.08		6 45	06.2		6 7 01.2			- 0 19.7		-0.6219	0.5651	0.1799	+ 1	-76
1519	6.5	10 21	06.24		5 54	12.0		7 08.0			- 0 13.1		+0.2220	0.5651	0.1799	+48	-22
1565	6.3	10 41	12.48		+ 4 57	50.9		16 06.9			+ 8 27.1		-0.4660	0.5670	-0.1857	+ 9	-64
1599	5.0	10 58	25.78		3 50	20.4		23 45.6			- 8 10.1		-0.7605	0.5689	0.1894	- 7	-87
1611	5.7	11 04	47.89		2 10	46.6		7 2 34.5			- 5 27.1		+0.3772	0.5697	0.1906	+58	-14
1635	5.4	11 15	09.88		2 14	15.0		7 08.5			- 1 02.8		-0.5546	0.5710	0.1921	+ 4	-72
1637	6.0	11 16	47.75		1 52	36.3		7 51.5			- 0 21.3		-0.3299	0.5713	0.1923	+17	-55
1649	6.3	11 21	11.04		+ 0 21	31.2		9 47.0			+ 1 30.2		+0.8223	0.5719	-0.1928	+90	+11
1652	5.5	11 21	55.14		+ 1 38	04.3		10 06.3			+ 1 48.8		-0.5191	0.5720	0.1929	+ 6	-69
1685	4.5	11 34	49.98		- 0 35	43.9		15 44.7			+ 7 15.3		+0.6221	0.5739	0.1939	+79	- 1
1708	6.2	11 46	54.80		0 05	20.2		20 59.4			-11 41.3		-0.9011	0.5757	0.1942	-16	-90
1735	6.4	11 58	54.66		1 32	13.3		8 2 10.0			- 6 41.9		-0.4627	0.5776	0.1940	+ 9	-64
1744	6.5	12 03	52.71		- 2 54	03.8		4 18.0			- 4 38.5		+0.4792	0.5785	-0.1938	+65	- 9
1787	6.0	12 25	44.08		4 23	10.4		13 37.0			+ 4 20.2		+0.1541	0.5823	0.1915	+43	-26
1798	6.3	12 29	30.96		4 49	26.9		15 13.0			+ 5 52.7		+0.2812	0.5830	0.1909	+51	-19
1807	5.9	12 34	39.38		5 36	12.8		17 23.1			+ 7 58.0		+0.6379	0.5839	0.1900	+79	0
1836	6.3	12 45	24.95		6 04	30.3		21 54.3			-11 40.9		+0.2488	0.5859	0.1878	+48	-21
2454	7.2	17 02	05.15		-17 25	55.0		13 3 13.1			-10 22.1		-1.0707	0.6094	-0.0284	-47	-90
2460	6.1	17 05	50.48		17 33	11.8		4 40.3			- 8 58.3		-0.9896	0.6091	0.0252	-40	-90
2463	6.9	17 07	48.69		19 22	57.7		5 26.2			- 8 14.3		+0.8141	0.6088	0.0235	+71	+13
2485	7.4	17 14	19.42		17 52	02.5		7 57.9			- 5 48.7		-0.7491	0.6082	0.0180	-25	-90
2495	6.0	17 17	28.63		17 42	44.4		9 11.5			- 4 38.1		-0.9248	0.6077	0.0153	-37	-90
2497	6.6	17 18	08.30		-19 17	19.6		9 26.9			- 4 23.3		+0.6453	0.6077	-0.0147	+61	+ 2
2508	6.3	17 22	11.52		18 24	23.9		11 01.7			- 2 52.3		-0.2563	0.6071	0.0113	+ 2	-51
2531	7.3	17 34	35.77		18 57	52.2		15 52.6			+ 1 47.0		+0.2728	0.6054	-0.0008	+32	-19
2548	7.5	17 41	44.03		17 43	27.2		18 40.8			+ 4 28.5		-0.9655	0.6042	+0.0053	-40	-90
2555	7.5	17 45	01.81		18 05	26.3		19 58.7			+ 5 43.3		-0.5895	0.6037	0.0080	-16	-78
2571	6.9	17 49	21.66		-19 30	44.7		21 41.2			+ 7 21.8		+0.8565	0.6029	+0.0116	+71	+16
2573	7.3	17 49	53.01		19 06	35.3		21 53.6			+ 7 33.7		+0.4541	0.6028	0.0121	+45	- 9
2578	6.4	17 53	28.88		18 47	38.7		23 19.0			+ 8 55.8		+0.1560	0.6021	0.0151	+26	-26
2596	7.3	17 59	25.93		19 06	14.9		14 1 40.6			+11 11.8		+0.5103	0.6010	0.0201	+50	- 6
2606	7.1	18 00	57.12		17 36	34.0		2 16.9			+11 46.7		-0.9844	0.6007	0.0213	-40	-90
2611	6.8	18 03	06.28		-19 45	21.2		3 08.3			-11 23.9		+1.1999	0.6003	+0.0231	+71	+48
2640	6.1	18 13	04.98		18 40	23.9		7 07.6			- 7 34.0		+0.2165	0.5982	0.0313	+31	-23
2646	6.0	18 14	47.22		17 23	13.2		7 48.6			- 6 54.5		-1.0634	0.5978	0.0327	-46	-90
2647	6.4	18 15	02.97		18 28	37.5		7 55.0			- 6 48.5		+0.0433	0.5978	0.0329	+21	-32
2649	6.6	18 15	25.16		18 48	45.3		8 03.9			- 6 39.9		+0.3878	0.5977	0.0332	+42	-13
2653	6.4	18 16	17.55		-18 38	03.6		8 24.9			- 6 19.7		+0.2192	0.5975	+0.0339	+31	-22
2658	5.4-6.2	18 18	57.04		18 52	39.1		9 29.1			- 5 18.0		+0.5032	0.5969	0.0361	+51	- 6
2674	6.0	18 25	31.70		17 49	27.7		12 08.4			- 2 44.8		-0.4620	0.5954	0.0414	- 6	-66
2680	5.8	18 27	45.99		18 45	15.2		13 02.8			- 1 52.5		+0.5203	0.5949	0.0431	+52	- 5
2685	7.0	18 28	53.49		18 56	02.7		13 30.1			- 1 26.2		+0.7231	0.5946	0.0440	+71	+ 7
2686	5.2	18 29	00.92		-18 25	47.9		13 33.2			- 1 23.3		+0.2132	0.5946	+0.0441	+32	-23
2687	6.6-7.3	18 29	27.20		19 09	11.4		13 43.8			- 1 13.0		+0.9559	0.5945	0.0445	+71	+23
2690	7.0	18 30	44.81		18 23	51.0		14 15.3			- 0 42.7		+0.2118	0.5942	0.0455	+32	-23
2699	7.2	18 32	57.36		19 17	58.8		15 09.2			+ 0 09.1		+1.1711	0.5936	0.0473	+71	+43
2705	6.8	18 35	27.54		-17 15	54.5		16 10.4			+ 1 08.0		-0.8493	0.5930	+0.0492	-28	-90

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

NOVEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
2722	7.1	18 43	12.79		-17 35	11.1		14 19	20.8		+ 4	11.1	-0.3575	0.5911	+0.0553	+ 1	-58
2731	6.5	18 46	20.10		18 38	45.1		20 37.7			+ 5	25.1	+0.7962	0.5902	0.0577	+72	+11
2737	6.8	18 48	56.14		17 12	05.5		21 42.0			+ 6	27.0	-0.6157	0.5896	0.0597	-13	-81
2745	6.9	18 50	41.28		18 41	07.6		22 25.4			+ 7	08.7	+0.9442	0.5891	0.0611	+72	+22
2755	6.6	18 53	49.11		18 45	40.4		23 43.1			+ 8	23.5	+1.1032	0.5883	0.0634	+72	+35
2764	6.3	18 57	01.76		-18 37	16.8		15 1 03.0			+ 9	40.4	+1.0471	0.5874	+0.0659	+72	+30
2786	6.0	19 04	29.66		16 17	28.7		4 09.7			-11	19.9	-1.1275	0.5853	0.0715	-48	-90
2789	7.3	19 04	55.06		17 18	16.5		4 20.3			-11	09.6	-0.0751	0.5852	0.0717	+18	-39
2808	7.4	19 12	27.33		17 24	59.9		7 30.2			- 8	06.8	+0.2760	0.5831	0.0773	+39	-19
2812	7.5	19 13	03.98		16 10	09.4		7 45.6			- 7	51.9	-0.9870	0.5829	0.0777	-35	-90
2815	7.1	19 15	17.91		-16 02	21.4		8 42.1			- 6	57.4	-1.0475	0.5822	+0.0793	-40	-90
2820	7.2	19 16	47.74		15 58	55.7		9 20.1			- 6	20.9	-1.0562	0.5818	0.0804	-40	-90
2826	4.0	19 19	16.72		17 55	25.9		10 23.2			- 5	20.0	+1.0294	0.5811	0.0822	+73	+28
2827	4.6	19 19	21.78		16 01	52.6		10 25.4			- 5	18.0	-0.9179	0.5811	0.0822	-30	-90
2830	6.9	19 21	25.94		17 16	25.8		11 18.1			- 4	27.2	+0.4357	0.5804	0.0837	+50	-10
2856	6.6-7.6	19 31	57.10		-16 27	44.6		15 47.8			- 0	07.3	-0.0090	0.5773	+0.0910	+24	-35
2871	7.1	19 36	50.71		17 00	03.5		17 54.2			+ 1	54.6	+0.7443	0.5758	0.0943	+73	+ 8
2874	6.8	19 37	31.73		15 15	36.6		18 11.9			+ 2	11.7	-1.0313	0.5756	0.0948	-37	-90
2876	5.4	19 38	21.60		16 23	11.5		18 33.5			+ 2	32.5	+0.1699	0.5754	0.0953	+34	-25
2880	5.1	19 40	09.56		16 13	10.1		19 20.2			+ 3	17.5	+0.0715	0.5748	0.0965	+29	-31
2883	5.5	19 41	12.41		-15 33	51.7		19 47.4			+ 3	43.8	-0.5640	0.5745	+0.0972	- 6	-75
2900	6.8	19 49	22.02		14 52	49.7		23 20.7			+ 7	09.4	-0.9210	0.5720	0.1025	- 28	-90
2905	6.4	19 50	46.82		14 42	26.3		23 57.8			+ 7	45.3	-1.0378	0.5715	0.1035	-36	-90
2913	5.0	19 55	36.74		15 35	58.7		2 05.1			+ 9	48.1	+0.1132	0.5700	0.1065	+32	-29
2927	7.2	20 01	13.38		15 31	38.6		4 33.8			-11	48.5	+0.3065	0.5682	0.1100	+44	-18
2936	6.8	20 06	09.73		-15 08	55.7		6 45.4			- 9	41.4	+0.1561	0.5667	+0.1130	+35	-26
2968	6.2	20 18	27.67		14 54	49.5		12 16.2			- 4	22.0	+0.5545	0.5628	0.1202	+63	- 4
2969	3.2	20 18	41.84		14 54	37.3		12 22.6			- 4	15.8	+0.5638	0.5628	0.1204	+64	- 3
2972	6.7	20 21	08.02		14 23	14.7		13 28.7			- 3	12.0	+0.1486	0.5620	0.1217	+36	-27
2975	7.0	20 21	55.93		14 14	42.8		13 50.4			- 2	51.0	+0.0434	0.5617	0.1222	+30	-32
3002	6.2	20 31	54.20		-13 51	40.8		18 23.0			+ 1	32.3	+0.2075	0.5586	+0.1277	+40	-23
3006	7.0	20 34	00.22		12 31	20.6		19 20.7			+ 2	28.2	-1.0800	0.5580	0.1287	-37	-90
3045	6.0	20 48	25.74		12 41	46.7		2 01.2			+ 8	55.3	-0.0144	0.5535	0.1361	+28	-36
3051	7.0	20 50	14.83		13 21	22.9		2 52.2			+ 9	44.6	+0.8005	0.5530	0.1369	+77	+11
3054	6.4	20 50	50.60		11 43	40.8		3 08.9			+10	00.8	-0.8860	0.5528	0.1372	-21	-90
3065	7.5	20 55	46.99		-12 06	43.8		5 27.9			-11	44.9	-0.1589	0.5513	+0.1396	+21	-44
3070	6.6	20 57	39.22		13 12	37.7		6 20.7			-10	53.8	+1.1300	0.5507	0.1405	+77	+35
3075	7.1	20 59	45.30		11 51	22.6		7 20.1			- 9	56.3	-0.1678	0.5501	0.1414	+21	-45
3093	4.5	21 07	21.29		11 32	13.7		10 56.3			- 6	27.1	+0.0083	0.5479	0.1448	+31	-34
3104	6.5	21 12	03.35		10 46	26.7		13 10.9			- 4	16.9	-0.4777	0.5465	0.1468	+ 4	-66
3111	6.8	21 14	45.24		-10 18	18.7		14 28.4			- 3	01.8	-0.7878	0.5457	+0.1479	-13	-90
3128	6.2	21 20	44.13		9 29	35.6		17 21.1			- 0	14.6	-1.2272	0.5440	0.1503	-49	-90
3133	5.8	21 23	00.59		9 55	20.6		18 27.0			+ 0	49.2	-0.6033	0.5434	0.1512	- 2	-77
3154	7.4	21 29	22.56		9 55	23.2		21 32.4			+ 3	48.7	-0.1322	0.5416	0.1537	+24	-43
3163	7.3	21 34	42.78		10 21	26.3		18 0 08.7			+ 6	20.1	+0.7364	0.5402	0.1556	+80	+ 6
3184	7.1	21 42	43.93		- 9 13	26.2		4 05.1			+10	09.1	+0.1385	0.5381	+0.1583	+40	-27
3185	5.3	21 42	48.92		9 16	12.1		4 07.5			+10	11.5	+0.1946	0.5381	0.1583	+43	-24
3187	6.2	21 44	04.87		9 27	51.5		4 45.0			+10	47.9	+0.5027	0.5378	0.1588	+64	- 7
3199	6.8	21 48	24.27		9 10	21.7		6 53.4			-11	07.8	+0.5305	0.5367	0.1601	+67	- 6
3212	7.5	21 54	04.04		7 10	24.3		9 42.3			- 8	24.1	-1.1711	0.5353	0.1618	-40	-90
3216	6.6	21 55	28.79		- 8 45	31.4		10 24.6			- 7	43.1	+0.6527	0.5350	+0.1622	+78	+ 1
3229	5.6	22 01	06.99		6 43	10.9		13 13.7			- 4	59.1	-1.0891	0.5336	0.1638	-32	-90
3247	7.0	22 07	16.79		8 23	11.5		16 19.7			- 1	58.8	+1.2233	0.5322	0.1654	+82	+44
3248	6.6	22 07	20.02		7 44	37.6		16 21.3			- 1	57.2	+0.5324	0.5323	0.1655	+68	- 6
3259	7.4	22 10	33.92		- 6 40	15.0		17 59.2			- 0	22.3	-0.3584	0.5316	+0.1662	+14	-57

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

NOVEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels			
		h	m	s	°	'	"	d	h	m	h	m				°	'	
3272	5.8	22	14	58.11	-	5	35	27.0	18	20	13.0	+ 1	47.5	-1.1574	0.5306	+0.1673	-38	-90
3281	7.5	22	19	15.14		6	26	54.5		22	23.6	+ 3	54.1	+0.1374	0.5298	0.1683	+41	-27
3287	5.8	22	21	58.78		5	02	36.2		23	47.0	+ 5	15.0	-1.1539	0.5292	0.1688	-37	-90
3290	7.3	22	23	58.63		5	23	06.5	19	0	48.1	+ 6	14.4	-0.6108	0.5288	0.1692	0	-78
3320	5.3	22	35	38.10		4	26	18.3		6	46.9	-11	57.6	-0.6236	0.5267	0.1714	0	-79
3326	6.4	22	38	40.79	-	3	45	59.3		8	21.1	-10	26.2	-1.0869	0.5262	+0.1719	-31	-90
3328	7.0	22	39	58.18		5	18	52.7		9	01.1	- 9	47.4	+0.7152	0.5260	0.1721	+85	+ 5
3344	6.8	22	45	43.44		4	26	26.7		11	59.7	- 6	54.0	+0.2762	0.5251	0.1729	+51	-20
3366	6.6	22	55	00.04		3	27	48.3		16	49.0	- 2	13.2	+0.0452	0.5237	0.1741	+37	-32
3370	6.2	22	56	09.01		2	36	47.7		17	24.9	- 1	38.3	-0.7805	0.5236	0.1742	- 9	-90
3411	7.2	23	12	00.09	-	2	51	24.5	20	1	42.8	+ 6	25.1	+0.9376	0.5217	+0.1755	+88	+19
3420	7.1	23	13	52.20		1	38	46.0		2	41.7	+ 7	22.3	-0.2185	0.5215	0.1755	+23	-48
3460	7.1	23	27	24.53		1	15	37.3		9	50.0	- 9	41.8	+0.6126	0.5204	0.1759	+78	- 1
3467	6.5	23	29	51.71	-	1	18	39.9		11	07.8	- 8	26.3	+0.8968	0.5202	0.1759	+89	+16
3502	7.4	23	44	29.14	+ 0	18	13.6			18	52.6	- 0	54.8	+0.4816	0.5195	0.1756	+66	- 9
3507	6.4	23	46	43.87	+ 1	59	17.7			20	04.1	+ 0	14.7	-1.1669	0.5194	+0.1755	-37	-89
3508	5.8	23	47	21.96		0	50	59.1		20	24.3	+ 0	34.3	+0.1480	0.5193	0.1755	+44	-27
3515	6.2	23	50	59.22		1	51	50.5		22	19.7	+ 2	26.4	-0.6340	0.5193	0.1753	0	-80
6	6.9	0	03	16.77		3	22	45.7	21	4	51.8	+ 8	47.3	-1.1667	0.5190	0.1742	-37	-87
30	7.0	0	13	51.59		4	01	28.7		10	29.5	- 9	44.7	-0.9039	0.5191	0.1730	-17	-86
53	6.9	0	24	10.72	+ 3	35	59.9			15	58.8	- 4	24.8	+0.5113	0.5194	+0.1715	+68	- 6
64	6.6	0	28	02.80		4	38	04.3		18	02.2	- 2	25.0	-0.2826	0.5196	0.1708	+19	-51
98	6.2	0	45	17.09		6	31	06.6	22	3	11.2	+ 6	28.3	-0.8238	0.5205	0.1673	-11	-84
104	5.8	0	46	14.65		5	04	16.0		3	41.7	+ 6	57.9	+0.8663	0.5206	0.1671	+90	+15
132	6.9	0	56	12.59		6	37	27.5		8	58.1	-11	54.7	+0.0185	0.5214	0.1647	+36	-32
136	6.3	0	57	42.94	+ 6	15	47.9			9	45.9	-11	08.4	+0.5499	0.5215	+0.1643	+72	- 3
146	4.4	1	00	49.70		7	40	14.9		11	24.5	- 9	32.6	-0.7427	0.5217	0.1634	- 6	-83
148	6.9	1	01	40.29		6	32	46.2		11	51.2	- 9	06.7	+0.5781	0.5218	0.1632	+75	- 2
162	6.9	1	04	30.40		8	08	32.8		13	20.9	- 7	39.6	-0.9502	0.5221	0.1624	-20	-82
180	5.6	1	11	36.15		7	21	35.6		17	05.1	- 4	01.8	+0.5213	0.5228	0.1603	+69	- 4
181	6.5	1	11	37.64	+ 7	21	45.6			17	05.8	- 4	01.1	+0.5203	0.5228	+0.1603	+69	- 4
184	6.2	1	12	35.27		6	46	46.4		17	36.1	- 3	31.7	+1.2486	0.5230	0.1600	+90	+49
252	7.4	1	40	26.67		10	02	21.1	23	8	09.8	+10	36.5	-0.1085	0.5264	0.1503	+29	-38
264	7.0	1	44	59.51		10	38	26.3		10	31.4	-11	06.1	-0.4237	0.5270	0.1485	+12	-57
272	5.9	1	48	42.36		10	50	29.9		12	26.8	- 9	14.1	-0.3627	0.5276	0.1470	+15	-53
290	6.1	1	57	15.13	+12	05	50.2			16	51.4	- 4	57.2	-1.1159	0.5288	+0.1434	-34	-78
422	5.5	2	49	14.88		14	54	51.0	24	19	14.3	- 3	22.0	-0.7800	0.5374	0.1175	-10	-76
764	5.0	5	05	02.90		18	35	23.8	27	12	29.9	+11	48.5	-0.0081	0.5572	0.0245	+34	-18
798	6.4	5	18	32.55		19	46	20.0		18	45.6	- 6	08.3	-1.1780	0.5583	0.0141	-45	-71
814	5.3	5	24	47.85		17	55	35.5		21	39.1	- 3	20.5	+0.8694	0.5588	0.0092	+90	+33
832	4.7	5	29	49.81	+18	33	48.8			23	58.6	- 1	05.7	+0.1913	0.5592	+0.0053	+47	- 5
836	5.5	5	31	08.72		18	30	38.4	28	0	35.0	- 0	30.5	+0.2518	0.5593	+0.0042	+51	- 2
895	5.9	5	52	32.33		19	44	28.0		10	25.6	+ 9	00.3	-1.1266	0.5604	-0.0125	-38	-71
913	5.2	6	01	03.00		19	41	26.3		14	19.9	-11	13.3	-1.1324	0.5608	0.0192	-39	-71
934	6.4	6	08	39.07		18	08	16.2		17	48.8	- 7	51.4	+0.4751	0.5610	0.0251	+67	+ 8
943	6.2	6	11	09.94	+18	41	25.5			18	57.9	- 6	44.6	-0.1539	0.5611	-0.0271	+26	-27
944	5.7	6	12	06.16		17	55	02.2		19	23.6	- 6	19.8	+0.6720	0.5612	0.0278	+89	+19
947	5.2	6	12	27.37		19	10	10.7		19	33.3	- 6	10.4	-0.6894	0.5611	0.0281	- 5	-67
970	6.5	6	19	03.61		17	46	54.2		22	34.6	- 3	15.2	+0.7210	0.5613	0.0332	+90	+22
1029	5.1	6	40	02.24		17	41	04.5	29	8	09.7	+ 6	00.5	+0.4279	0.5615	0.0494	+63	+ 3
1040	6.2	6	45	00.86	+18	14	12.7			10	26.1	+ 8	12.3	-0.2843	0.5615	-0.0532	+19	-37
1072	6.2	7	00	03.56		17	48	46.4		17	18.2	- 9	09.5	-0.2315	0.5613	0.0645	+22	-35
1073	6.0	7	00	12.48		16	43	56.4		17	22.3	- 9	05.6	+0.9262	0.5613	0.0646	+90	+32
1096	5.3	7	11	02.09		16	13	39.2		22	18.9	- 4	19.0	+1.1273	0.5611	0.0726	+90	+47
1106	3.6	7	15	45.29	+16	36	48.0		30	0	28.3	- 2	14.0	+0.5524	0.5610	-0.0761	+74	+ 7

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

NOVEMBER-DECEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
1141	5.6	7 29	27.57		+17 10	19.3		30	6 44.0		+ 3 49.1		-0.5538	0.5606	-0.0859	+ 4	-59
1147	5.1	7 31	17.09		15 54	50.0			7 34.1		+ 4 37.5		+0.7201	0.5606	0.0873	+90	+16
1197	6.0	7 54	40.71		15 53	55.3			18 16.6		- 9 01.7		-0.2862	0.5597	0.1034	+19	-42
1198	6.2	7 56	12.09		16 37	39.8			18 58.5		- 8 21.2		-1.1351	0.5597	0.1044	-37	-74
1210	5.9	7 59	10.98		16 34	01.5			20 20.5		- 7 01.9		-1.2139	0.5595	0.1064	-47	-74
1234	6.1	8 08	41.58		+14 44	59.3		1	0 42.2		- 2 49.0		+0.2418	0.5591	-0.1126	+50	-13
1237	6.4	8 10	05.39		14 07	32.4			1 20.7		- 2 11.8		+0.8323	0.5590	0.1135	+90	+20
1271	5.9	8 26	20.86		14 20	43.9			8 48.9		+ 5 01.4		-0.2882	0.5584	0.1237	+19	-45
1281	6.4	8 31	29.54		13 23	47.3			11 10.9		+ 7 18.6		+0.4197	0.5581	0.1268	+62	- 5
1309	5.7	8 40	57.54		12 49	36.8			15 32.4		+11 31.4		+0.4558	0.5578	0.1324	+65	- 4
1318	5.7	8 44	41.88		+12 15	33.8			17 15.8		-10 48.7		+0.8244	0.5577	-0.1346	+90	+17
1332	5.7	8 53	41.90		11 46	54.6			21 24.8		- 6 48.0		+0.7575	0.5573	0.1396	+90	+13
1341	4.3	8 56	15.35		12 00	55.9			22 35.6		- 5 39.6		+0.3456	0.5572	0.1410	+56	-11
1359	5.1	9 05	32.19		10 49	56.6		2	2 52.6		- 1 31.2		+0.9740	0.5569	0.1460	+90	+26
1364	6.5	9 07	33.30		11 43	49.0			3 48.5		- 0 37.1		-0.1059	0.5568	0.1470	+29	-36
1381	6.3	9 15	38.48		+11 40	18.7			7 32.6		+ 2 59.6		-0.6007	0.5566	-0.1511	+ 2	-70
1397	5.5	9 26	16.18		9 14	04.5			12 27.4		+ 7 44.5		+1.1963	0.5564	0.1562	+90	+45
1410	5.3	9 29	46.21		9 53	44.8			14 04.5		+ 9 18.3		+0.2503	0.5564	0.1578	+50	-18
1428	3.8	9 38	58.19		10 04	40.7			18 19.7		-10 34.9		-0.6195	0.5563	0.1619	+ 1	-73
1458	5.9	9 54	15.89		9 07	35.9		3	1 24.0		- 3 44.7		-0.7936	0.5563	0.1681	-10	-81
1465	6.3	9 55	57.63		+ 8 30	32.4			2 11.1		- 2 59.3		-0.2834	0.5563	-0.1688	+19	-49
1468	4.9	9 58	03.15		8 14	25.0			3 09.1		- 2 03.2		-0.1676	0.5563	0.1696	+26	-42
1518	6.3	10 20	51.92		6 45	01.1			13 41.2		+ 8 07.8		-0.4508	0.5568	0.1773	+10	-62
1519	6.5	10 21	07.08		5 54	06.9			13 48.2		+ 8 14.6		+0.4054	0.5568	0.1774	+60	-12
1565	6.3	10 41	13.31		4 57	45.8			23 03.7		- 6 48.5		-0.2950	0.5578	0.1829	+19	-52
1599	5.0	10 58	26.60		+ 3 50	15.3		4	6 57.6		+ 0 49.5		-0.5974	0.5590	-0.1865	+ 2	-75
1611	5.7	11 04	48.70		2 10	41.6			9 52.4		+ 3 38.4		+0.5576	0.5595	0.1876	+72	- 4
1635	5.4	11 15	10.68		2 14	09.9			14 36.0		+ 8 12.5		-0.3921	0.5605	0.1890	+13	-59
1637	6.0	11 16	48.55		1 52	31.3			15 20.6		+ 8 55.5		-0.1641	0.5606	0.1892	+26	-44
1649	6.3	11 21	11.83		0 21	26.2			17 20.3		+10 51.1		+1.0064	0.5611	0.1897	+90	+24
1652	5.5	11 21	55.94		+ 1 37	59.3			17 40.3		+11 10.5		-0.3581	0.5612	-0.1898	+15	-57
1685	4.5	11 34	50.77		- 0 35	48.8			23 31.3		- 7 10.5		+0.7989	0.5627	0.1907	+90	+10
1708	6.2	11 46	55.57		0 05	25.1		5	4 57.9		- 1 55.1		-0.7551	0.5642	0.1911	- 7	-90
1735	6.4	11 58	55.41		1 32	18.1			10 20.4		+ 3 16.3		-0.3137	0.5660	0.1909	+18	-54
1744	6.5	12 03	53.46		2 54	08.5			12 33.4		+ 5 24.7		+0.6426	0.5667	0.1907	+80	0
1787	6.0	12 25	44.80		- 4 23	14.8			22 14.1		- 9 14.9		+0.3017	0.5705	-0.1886	+52	-18
1798	6.3	12 29	31.68		4 49	31.2			23 53.8		- 7 38.7		+0.4291	0.5711	0.1880	+61	-11
1807	5.9	12 34	40.10		5 36	17.1		6	2 09.0		- 5 28.3		+0.7894	0.5721	0.1872	+85	+ 9
1836	6.3	12 45	25.64		6 04	34.4			6 50.5		- 0 56.7		+0.3876	0.5741	0.1852	+58	-14
1945	5.4	13 30	47.62		9 57	08.1		7	2 15.9		- 6 13.5		+0.7781	0.5834	0.1718	+81	+ 9
1973	6.2	13 45	02.43		- 9 30	09.2			8 14.4		- 0 28.3		-0.6797	0.5864	-0.1661	- 6	-87
Neptune	7.8	14 16	50.55		11 52	50.0			21 22.0		-11 50.2		-0.4013	0.5919	0.1505	+ 8	-60
2053	4.6	14 16	52.39		13 10	50.3			21 22.9		-11 49.5		+0.8860	0.5930	0.1508	+77	+16
2060	6.3	14 21	12.16		11 31	30.2			23 08.8		-10 07.6		-1.0196	0.5940	0.1485	-31	-90
2064	6.5	14 22	27.52		11 28	55.1			23 39.5		- 9 38.0		-1.1380	0.5942	0.1478	-41	-90
2088	6.2	14 34	47.78		-12 07	46.0		8	4 39.6		- 4 49.5		-1.2174	0.5966	-0.1408	-50	-90
2114	5.8	14 47	03.03		13 58	35.8			9 35.3		- 0 05.2		-0.0641	0.5989	0.1334	+24	-39
2159	5.3	15 04	19.10		16 05	45.7			16 28.6		+ 6 31.9		+1.1520	0.6019	-0.1222	+74	+39
2789	7.3	19 04	54.92		17 18	17.0		12	14 41.6		+ 0 59.9		-0.2094	0.5934	+0.0712	+10	-48
2808	7.4	19 12	27.17		17 25	00.4			17 47.0		+ 3 58.2		+0.1332	0.5915	0.0768	+30	-27
2812	7.5	19 13	03.83		-16 10	10.0			18 02.0		+ 4 12.7		-1.1181	0.5914	+0.0773	-46	-90
2826	4.0	19 19	16.56		17 55	26.3			20 35.7		+ 6 40.6		+0.8743	0.5897	0.0819	+73	+16
2827	4.6	19 19	21.62		16 01	53.3			20 37.8		+ 6 42.6		-1.0537	0.5897	0.0819	-40	-90
2830	6.9	19 21	25.77		17 16	26.3			21 29.2		+ 7 32.1		+0.2849	0.5891	0.0835	+40	-19
2856	6.6-7.6	19 31	56.91		-16 27	45.2		13	1 51.9		+11 45.0		-0.1624	0.5862	+0.0910	+15	-45

New Moon—Dec. 10^d 17^h 23^m

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS
DECEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	'
2871	7.1	19	36	50.51	-17	00	04.1	13	3	55.0	-10	16.5	+0.5795	0.5848	+0.0944	+62	- 2
2874	6.8	19	37	31.53	15	15	37.4		4	12.2	- 9	59.9	-1.1775	0.5846	0.0948	-50	-90
2876	5.4	19	38	21.40	16	23	12.2		4	33.2	- 9	39.7	+0.0103	0.5844	0.0954	+25	-34
2880	5.1	19	40	09.36	16	13	10.8		5	18.7	- 8	55.9	-0.0883	0.5839	0.0966	+20	-40
2883	5.5	19	41	12.21	15	33	52.4		5	45.2	- 8	30.4	-0.7176	0.5836	0.0974	-15	-90
2889	7.1	19	44	46.70	-17	10	41.2		7	15.8	- 7	03.1	+1.0878	0.5825	+0.0998	+73	+33
2900	6.8	19	49	21.80	14	52	50.6		9	12.6	- 5	10.6	-1.0758	0.5812	0.1029	-40	-90
2913	5.0	19	55	36.51	15	35	59.5		11	52.4	- 2	36.5	-0.0572	0.5793	0.1069	+23	-38
2927	7.2	20	01	13.15	15	31	39.4		14	16.9	- 0	17.3	+0.1303	0.5776	0.1105	+33	-28
2936	6.8	20	06	09.49	15	08	56.6		16	24.8	+ 1	46.0	-0.0215	0.5761	0.1136	+25	-36
2968	6.2	20	18	27.41	-14	54	50.4		21	46.1	+ 6	55.9	+0.3644	0.5723	+0.1210	+49	-15
2969	3.2	20	18	41.58	14	54	38.2		21	52.3	+ 7	01.9	+0.3734	0.5722	0.1212	+50	-14
2972	6.7	20	21	07.76	14	23	15.7		22	56.5	+ 8	03.8	-0.0384	0.5714	0.1226	+25	-37
2975	7.0	20	21	55.66	14	14	43.8		23	17.6	+ 8	24.2	-0.1428	0.5712	0.1231	+20	-43
2995	6.2	20	28	45.61	15	11	35.6	14	2	18.6	+11	18.8	+1.2197	0.5690	0.1269	+75	+47
3002	6.2	20	31	53.92	-13	51	41.9		3	42.2	-11	20.5	+0.0134	0.5680	+0.1287	+29	-34
3027	7.0	20	42	15.71	14	20	00.5		8	20.2	- 6	52.0	+1.1161	0.5647	0.1342	+76	+34
3045	6.0	20	48	25.44	12	41	48.0		11	07.1	- 4	10.9	-0.2153	0.5627	0.1373	+17	-48
3051	7.0	20	50	14.54	13	21	24.1		11	56.5	- 3	23.1	+0.5886	0.5621	0.1383	+68	- 2
3054	6.4	20	50	50.31	11	43	42.1		12	12.8	- 3	07.5	-0.10775	0.5619	0.1385	-36	-90
3065	7.5	20	55	46.69	-12	06	45.1		14	27.7	- 0	57.1	-0.3620	0.5604	+0.1410	+10	-58
3070	6.6	20	57	38.91	13	12	39.0		15	19.0	- 0	07.6	+0.9101	0.5597	0.1418	+77	+18
3075	7.1	20	59	45.00	11	51	23.9		16	16.7	+ 0	48.2	-0.3729	0.5591	0.1428	+ 9	-58
3093	4.5	21	07	20.98	11	32	15.1		19	46.6	+ 4	11.2	-0.2029	0.5567	0.1463	+19	-47
3104	6.5	21	12	03.04	10	46	28.1		21	57.4	+ 6	17.6	-0.6854	0.5552	0.1483	- 7	-88
3111	6.8	21	14	44.92	-10	18	20.2		23	12.7	+ 7	30.4	-0.9929	0.5544	+0.1495	-27	-90
3133	5.8	21	23	00.27	9	55	22.1	15	3	04.6	+11	14.7	-0.8147	0.5518	0.1528	-15	-90
3154	7.4	21	29	22.23	9	55	24.7		6	04.8	- 9	51.0	-0.3522	0.5499	0.1553	+12	-57
3163	7.3	21	34	42.45	10	21	27.9		8	36.9	- 7	23.9	+0.5038	0.5483	0.1572	+64	- 7
3169	6.2	21	37	15.40	10	45	41.2		9	49.8	- 6	13.3	+1.1241	0.5475	0.1582	+80	+34
3184	7.1	21	42	43.60	- 9	13	27.8		12	26.9	- 3	41.2	-0.0903	0.5459	+0.1600	+27	-40
3185	5.3	21	42	48.59	9	16	13.7		12	29.3	- 3	38.9	-0.0349	0.5459	0.1600	+30	-37
3187	6.2	21	44	04.54	9	27	53.1		13	05.8	- 3	03.5	+0.2691	0.5455	0.1604	+48	-20
3199	6.8	21	48	23.93	9	10	23.3		15	10.8	- 1	02.5	+0.2949	0.5443	0.1618	+50	-19
3216	6.6	21	55	28.46	8	45	33.1		18	36.6	+ 2	16.7	+0.4133	0.5423	0.1640	+58	-12
3233	7.2	22	02	20.76	- 8	54	53.6		21	57.8	+ 5	31.6	+1.1341	0.5404	+0.1659	+82	+35
3247	7.0	22	07	16.45	8	23	13.2	16	0	22.9	+ 7	52.2	+0.9739	0.5391	0.1672	+82	+22
3248	6.6	22	07	19.68	7	44	39.4		0	24.5	+ 7	53.8	+0.2907	0.5391	0.1672	+50	-19
3259	7.4	22	10	33.58	6	40	16.8		2	00.1	+ 9	26.3	-0.5912	0.5382	0.1679	+ 1	-76
3269	4.3	22	14	39.89	7	59	13.8		4	01.8	+11	24.4	+1.1611	0.5372	0.1689	+83	+37
3281	7.5	22	19	14.80	- 6	26	56.3		6	18.3	-10	23.4	-0.1032	0.5361	+0.1700	+28	-41
3285	6.1	22	21	22.81	7	24	05.5		7	22.0	- 9	21.6	+1.1009	0.5355	0.1704	+83	+31
3290	7.3	22	23	58.29	5	23	08.4		8	39.6	- 8	06.4	-0.8446	0.5349	0.1709	-14	-90
3308	6.2	22	29	09.02	6	45	50.1		11	15.2	- 5	35.6	+1.0826	0.5337	0.1719	+84	+30
3311	7.0	22	30	24.48	6	40	41.4		11	53.0	- 4	58.9	+1.0992	0.5334	0.1722	+84	+31
3320	5.3	22	35	37.76	- 4	26	20.2		14	30.7	- 2	26.0	-0.8599	0.5322	+0.1730	-14	-90
3328	7.0	22	39	57.83	5	18	54.6		16	42.1	- 0	18.6	+0.4649	0.5313	0.1737	+64	-10
3344	6.8	22	45	43.10	4	26	28.7		19	37.3	+ 2	31.3	+0.0294	0.5301	0.1745	+36	-33
3366	6.6	22	54	59.70	3	27	50.2	17	0	21.2	+ 7	06.8	-0.2003	0.5283	0.1756	+23	-47
3370	6.2	22	56	08.67	2	36	49.7		0	56.5	+ 7	41.0	-1.0185	0.5280	0.1756	-25	-90
3411	7.2	23	11	59.75	- 2	51	26.5		9	06.2	- 8	23.8	+0.6841	0.5253	+0.1768	+85	+ 3
3420	7.1	23	13	51.87	1	38	47.9		10	04.2	- 7	27.5	-0.4624	0.5251	0.1769	+10	-64
3459	6.6	23	27	20.75	2	00	58.6		17	04.7	- 0	39.4	+1.1823	0.5232	0.1772	+88	+39
3460	7.1	23	27	24.20	1	15	39.3		17	06.5	- 0	37.7	+0.3630	0.5232	0.1772	+57	-15
3467	6.5	23	29	51.39	- 1	18	41.9		18	23.3	+ 0	36.9	+0.6455	0.5229	+0.1771	+81	+ 1

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

DECEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>		<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels			
		h	m	s	°	'	"	d	h	m	h	m				°	'	
3474	6.0	23	32	02.59	-	1	28	17	19	31.8	+	1	+1.0248	0.5227	+0.1771	+89	+28	
3502	7.4	23	44	28.83	+	0	18	18	2	02.8	+	8	+0.2357	0.5214	0.1767	+49	-22	
3508	5.8	23	47	21.65		0	50		3	33.6	+	9	-0.0951	0.5212	0.1765	+30	-40	
3515	6.2	23	50	58.92	1	51	48.7		5	27.9	+11	22.2	-0.8714	0.5209	0.1763	-14	-89	
30	7.0	0	13	51.30	4	01	27.0		17	32.1	-	0	-1.1345	0.5197	0.1738	-34	-86	
53	6.9	0	24	10.44	+	3	35	22	59.6		+	4	+0.2775	0.5195	+0.1723	+52	-19	
64	6.6	0	28	02.53	4	38	02.6	19	1	02.5	+	6	-0.5113	0.5195	0.1716	+7	-68	
98	6.2	0	45	16.84	6	31	05.0		10	09.8	-	8	45.5	-1.0429	0.5198	0.1680	-27	-84
104	5.8	0	46	14.40	5	04	14.3		10	40.2	-	8	16.0	+0.6414	0.5199	0.1678	+81	+1
132	6.9	0	56	12.35	6	37	25.9		15	56.1	-	3	09.1	-0.1981	0.5203	0.1653	+24	-45
136	6.3	0	57	42.70	+	6	15	16	43.8		-	2	22.8	+0.3324	0.5204	+0.1649	+55	-15
146	4.4	1	00	49.46	7	40	13.5		18	22.4	-	0	47.1	-0.9543	0.5206	0.1641	-20	-83
148	6.9	1	01	40.06	6	32	44.6		18	49.1	-	0	21.2	+0.3628	0.5206	0.1638	+57	-14
162	6.9	1	04	30.17	8	08	31.4		20	18.8	+	1	06.0	-1.1591	0.5208	0.1630	-37	-82
180	5.6	1	11	35.93	7	21	34.1	20	0	03.0	+	4	43.7	+0.3122	0.5214	0.1610	+54	-16
181	6.5	1	11	37.42	+	7	21	0	03.7		+	4	44.4	+0.3112	0.5214	+0.1609	+54	-16
184	6.2	1	12	35.05	6	46	44.9		0	34.1	+	5	13.9	+1.0379	0.5214	0.1607	+90	+28
214	6.4	1	26	14.54	7	44	59.9		7	44.1	-11	48.5	+1.0995	0.5228	0.1562	+90	+34	
226	6.6	1	31	09.94	7	59	57.2		10	18.7	-	9	18.5	+1.2237	0.5232	0.1544	+90	+47
247	6.7	1	38	26.11	8	33	13.5		14	06.3	-	5	37.5	+1.1905	0.5241	0.1518	+90	+43
252	7.4	1	40	26.50	+10	02	19.9		15	09.0	-	4	36.7	-0.2967	0.5244	+0.1510	+19	-49
257	4.5	1	43	14.48	8	57	08.2		16	36.4	-	3	11.8	+1.1265	0.5247	0.1500	+90	+37
264	7.0	1	44	59.35	10	38	25.2		17	30.9	-	2	18.9	-0.6081	0.5249	0.1493	+1	-72
272	5.9	1	48	42.21	10	50	28.8		19	26.6	-	0	26.6	-0.5444	0.5254	0.1478	+5	-66
284	7.4	1	52	14.29	11	12	06.6		21	16.5	+	1	20.0	-0.6745	0.5259	0.1464	-3	-77
301	6.8	2	00	47.20	+10	49	19.9	21	1	41.5	+	5	37.2	+0.3847	0.5272	+0.1427	+59	-10
340	7.1	2	16	39.60	12	48	12.8		9	50.3	-10	28.5	-0.6764	0.5296	0.1355	-3	-76	
355	7.5	2	23	22.56	11	47	22.9		13	15.8	-	7	09.1	+0.9051	0.5308	0.1322	+90	+22
380	7.4	2	33	48.07	13	34	36.8		18	33.2	-	2	01.3	-0.3879	0.5326	0.1270	+13	-52
384	5.7	2	34	24.73	12	16	14.2		18	51.7	-	1	43.3	+1.0971	0.5327	0.1267	+90	+38
422	5.5	2	49	14.84	+14	54	50.4	22	2	19.6	+	5	30.9	-0.9111	0.5354	+0.1187	-18	-76
437	7.4	2	56	31.57	13	26	30.3		5	57.8	+	9	02.4	+1.1410	0.5368	0.1147	+90	+43
445	7.3	2	58	38.60	14	52	11.9		7	01.1	+10	03.8	-0.3173	0.5373	0.1135	+17	-46	
450	6.6	3	02	24.93	15	41	52.4		8	53.6	+11	52.8	-1.0212	0.5379	0.1113	-27	-75	
469	7.3	3	11	52.38	15	26	16.5		13	34.4	-	7	35.1	-0.2257	0.5397	0.1057	+22	-39
504	7.3	3	26	42.35	+14	51	19.8		20	51.3	-	0	31.8	+1.1526	0.5426	+0.0966	+90	+47
505	7.0	3	27	24.95	16	37	17.7		21	12.1	-	0	11.7	-0.7608	0.5428	0.0961	-9	-74
523	6.5	3	35	31.04	15	17	47.1	23	1	08.8	+	3	37.6	+1.0680	0.5443	0.0909	+90	+40
527	6.3	3	37	07.90	16	24	13.7		1	55.8	+	4	23.1	-0.0808	0.5446	0.0899	+30	-29
532	7.2	3	40	18.79	17	09	45.0		3	28.3	+	5	52.7	-0.7791	0.5452	0.0878	-10	-73
577	6.0	3	50	50.70	+17	12	19.4		8	33.2	+10	47.8	-0.3974	0.5472	+0.0808	+13	-48	
590	6.3	3	58	17.71	17	10	52.7		12	07.6	-	9	44.6	-0.0912	0.5486	0.0756	+30	-28
593	5.8	3	58	28.42	18	04	43.5		12	12.7	-	9	39.7	-1.0706	0.5486	0.0755	-32	-72
610	6.2	4	05	39.96	17	13	50.0		15	38.7	-	6	20.3	+0.1120	0.5499	0.0705	+42	-16
620	6.3	4	10	11.69	17	10	19.8		17	48.0	-	4	15.2	+0.3244	0.5507	0.0674	+55	-4
639	6.0	4	18	03.61	+18	38	40.5		21	31.6	-	0	38.8	-1.0489	0.5520	+0.0618	-30	-72
648	3.9	4	20	35.67	17	26	47.3		22	43.4	+	0	30.7	+0.3368	0.5525	0.0599	+56	-3
653	4.8	4	21	45.42	17	20	56.5		23	16.4	+	1	02.5	+0.4761	0.5527	0.0591	+67	+5
658	4.2	4	23	08.52	17	50	04.0		23	55.5	+	1	40.5	-0.0173	0.5530	0.0581	+34	-22
684	6.2	4	31	12.03	17	55	48.9	24	3	42.9	+	5	20.4	+0.0868	0.5542	0.0522	+40	-16
718	6.1	4	43	54.70	+18	39	38.0		9	39.6	+11	05.3	-0.4288	0.5562	+0.0428	+11	-46	
730	5.1	4	49	00.11	18	46	11.7		12	01.7	-10	37.2	-0.4511	0.5570	0.0389	+9	-47	
736	6.2	4	52	35.32	19	25	07.7		13	41.7	-	9	00.6	-1.0960	0.5575	0.0362	-35	-71
764	5.0	5	05	03.20	18	35	23.2		19	27.7	-	3	26.1	-0.0103	0.5593	0.0267	+34	-18
798	6.4	5	18	32.89	+19	46	19.5	25	1	40.1	+	2	33.8	-1.1616	0.5609	+0.0163	-42	-71

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS

DECEMBER

Cat. No.	Mag.	Apparent Right Ascension			Apparent Declination			<i>T</i>			<i>H</i>		<i>Y</i>	<i>x'</i>	<i>y'</i>	Limiting Parallels	
		h	m	s	°	'	"	d	h	m	h	m				°	°
814	5.3	5	24	48.20	+17	55	34.6	25	4	32.0	+ 5	20.0	+0.8825	0.5616	+0.0113	+90	+34
1106	3.6	7	15	45.89	16	36	45.7	27	6	39.2	+ 5	44.4	+0.6726	0.5667	-0.0749	+89	+15
1141	5.6	7	29	28.22	17	10	17.0		12	48.8	+11	41.3	-0.4148	0.5665	0.0848	+12	-49
1147	5.1	7	31	17.73	15	54	47.4		13	38.0	-11	31.2	+0.8536	0.5664	0.0862	+90	+25
1197	6.0	7	54	41.39	15	53	52.5	28	0	10.0	- 1	20.8	-0.1264	0.5655	0.1026	+28	-33
1198	6.2	7	56	12.78	+16	37	37.1		0	51.2	- 0	41.0	-0.9697	0.5655	-0.1036	-23	-74
1210	5.9	7	59	11.67	16	33	58.8		2	11.9	+ 0	36.9	-1.0457	0.5653	0.1056	-29	-74
1234	6.1	8	08	42.28	14	44	56.1		6	29.5	+ 4	45.7	+0.4110	0.5648	0.1119	+61	- 4
1237	6.4	8	10	06.10	14	07	29.1		7	07.4	+ 5	22.3	+0.9998	0.5648	0.1129	+90	+32
1271	5.9	8	26	21.60	14	20	40.5		14	28.8	-11	31.4	-0.1021	0.5638	0.1232	+29	-33
1281	6.4	8	31	30.28	+13	23	43.7		16	48.8	- 9	16.2	+0.6071	0.5636	-0.1263	+79	+ 5
1309	5.7	8	40	58.30	12	49	33.0		21	06.6	- 5	07.0	+0.6507	0.5629	0.1320	+84	+ 7
1318	5.7	8	44	42.64	12	15	30.0		22	48.6	- 3	28.5	+1.0209	0.5627	0.1341	+90	+31
1332	5.7	8	53	42.67	11	46	50.5	29	2	54.4	+ 0	29.0	+0.9614	0.5622	0.1392	+90	+26
1341	4.3	8	56	16.13	12	00	51.9		4	04.3	+ 1	36.5	+0.5527	0.5619	0.1406	+73	+ 1
1359	5.1	9	05	32.97	+10	49	52.3		8	18.4	+ 5	41.9	+1.1864	0.5613	-0.1456	+90	+45
1364	6.5	9	07	34.09	11	43	44.8		9	13.7	+ 6	35.4	+0.1107	0.5612	0.1466	+41	-24
1381	6.3	9	15	39.28	11	40	14.4		12	55.5	+10	09.7	-0.3776	0.5607	0.1507	+14	-53
1409	5.1	9	29	45.45	11	28	45.1		19	23.1	- 7	35.8	-1.1714	0.5598	0.1574	-39	-79
1410	5.3	9	29	47.03	9	53	40.2		19	23.8	- 7	35.0	+0.4813	0.5598	0.1574	+66	- 5
1428	3.8	9	38	59.01	+10	04	36.1		23	37.1	- 3	30.2	-0.3823	0.5593	-0.1615	+14	-55
1458	5.9	9	54	16.72	9	07	31.0	30	6	39.1	+ 3	17.6	-0.5484	0.5586	0.1677	+ 5	-68
1465	6.3	9	55	58.47	8	30	27.4		7	26.0	+ 4	02.9	-0.0370	0.5585	0.1683	+33	-35
1468	4.9	9	58	03.99	8	14	20.0		8	23.8	+ 4	58.8	+0.0798	0.5584	0.1691	+39	-28
1518	6.3	10	20	52.78	6	44	55.9		18	54.8	- 8	51.3	-0.1935	0.5577	0.1767	+24	-45
1519	6.5	10	21	07.93	+ 5	54	01.7		19	01.8	- 8	44.5	+0.6648	0.5576	-0.1768	+84	+ 3
1565	6.3	10	41	14.18	4	57	40.3	31	4	18.6	+ 0	13.7	-0.0302	0.5574	0.1820	+33	-36
1599	5.0	10	58	27.47	3	50	09.8		12	15.4	+ 7	54.6	-0.3299	0.5575	0.1854	+17	-54
1611	5.7	11	04	49.57	2	10	35.9		15	11.6	+10	44.9	+0.8329	0.5576	0.1865	+90	+12
1635	5.4	11	15	11.56	2	14	04.2		19	58.2	- 8	38.1	-0.1210	0.5579	0.1878	+28	-42
1637	6.0	11	16	49.43	+ 1	52	25.6		20	43.2	- 7	54.6	+0.1087	0.5579	-0.1879	+41	-29
1652	5.5	11	21	56.82	+ 1	37	53.6		23	04.6	- 5	37.9	-0.0860	0.5581	-0.1885	+30	-40

Full Moon—Dec. 26^d 03^h 54^m

Date		STAR			Ph.	Age of Moon	WASHINGTON				LONG. +72°30', LAT. +42°30'			
		Cat. No.	Name	Mag.			U. T.	<i>a</i>	<i>b</i>	<i>P</i>	U. T.	<i>a</i>	<i>b</i>	<i>P</i>
Jan.	1	391	BD+14°439	7.4	D	d	h	m	m	°	h	m	m	°
	1	403	o Ari	5.8	D	10.8	0 34.1	-2.1	+1.1	71	0 46.9	-1.9	+1.1	64
	1	413	BD+14°469	6.8	D	10.9	4 34.6	-1.3	+0.2	55	4 42.0	-1.2	+0.8	39
	3	654	234 B. Tau	6.0	D	12.8	0 28.0	—	—	16	Graze	—	—	5
	3	668	ε Tau	3.6	D	12.9	2 45.7	—	—	21	No occ.	—	—	...
	8	1397	ω Leo <i>m</i>	5.5	R	18.1	8 35.8	-2.2	-0.3	263	8 42.0	-1.6	-1.0	279
	12	1887	BD-8°3495	6.4	R	22.1	8 20.0	-1.0	-0.5	313	8 21.3	-0.7	-1.1	330
	26	98	60 Psc	6.2	D	6.1	1 31.7	-1.0	-2.0	103	1 29.8	-0.8	-1.5	90
	29	466	BD+15°447	7.3	D	9.2	2 32.7	-1.7	+2.8	26	No occ.	—	—	...
	29	593	163 B. Tau	5.8	D	10.1	23 28.0	-1.5	+2.7	43	23 45.4	-1.5	+3.2	33
Feb.	30	617	188 B. Tau	6.6	D	10.3	5 40.0	-1.0	+0.8	38	Graze	—	—	...
	1	904	BD+18°1040	7.1	D	12.2	3 19.1	-1.4	-4.2	151	3 14.9	-1.5	-2.4	131
	10	2118	α Lib	2.9	D	21.5	10 02.5	-3.0	+1.9	54	Graze	—	—	...
	10	2117	8 Lib	5.3	R	21.5	10 33.8	—	—	356	No occ.	—	—	...
	10	2118	α Lib	2.9	R	21.5	10 50.7	-1.1	-2.7	343	Graze	—	—	...
	12	2401	131 B. (Sco)	5.6	R	23.5	9 29.9	-1.5	+1.1	267	9 39.8	-1.4	+0.7	279
	24	422	σ Ari	5.5	D	6.3	23 17.5	-2.0	+0.3	67	23 27.5	-1.7	+0.6	56
	25	532	BD+16°497	7.2	D	7.3	23 43.8	-2.1	+0.4	69	23 54.8	-1.8	+0.7	57
	27	697	BD+18°661 (<i>var.</i>)	7.2-7.4	D	8.4	1 01.7	-1.9	-1.5	106	1 05.2	-1.6	-1.0	93
	27	710	BD+18°684	7.1	D	8.5	4 20.1	-0.8	-0.2	57	4 24.2	-0.9	+0.6	38
Mar.	1	1011	BD+17°1306	7.4	D	10.5	No occ.	—	—	...	5 30.2	+0.2	-3.0	153
	2	1147	68 Gem	5.1	D	11.5	5 33.8	-0.3	-2.8	149	5 26.5	-0.4	-2.3	133
	4	1397	ω Leo <i>m</i>	5.5	D	13.5	4 24.1	-1.1	-2.4	149	4 22.6	-1.3	-1.7	133
	22	272	54 (Cet)	5.9	D	2.5	23 54.9	—	—	142	23 43.1	-0.2	-2.7	119
	25	505	BD+16°450	7.0	D	4.6	0 59.4	-1.5	+2.5	24	No occ.	—	—	...
	26	658	68 Tau	4.2	D	5.7	3 08.5	+0.2	-2.2	125	3 00.7	+0.2	-1.7	110
	27	787	BD+18°812 <i>m</i>	7.5	D	6.7	No occ.	—	—	...	2 29.8	+0.2	-3.4	148
	28	934	BD+18°1112	6.4	D	7.7	2 39.0	+0.3	-4.6	162	2 26.8	-0.3	-2.8	140
	28	944	124 H ⁱ . Ori	5.7	D	7.7	No occ.	—	—	...	4 21.7	+1.0	-3.9	166
	28	951	BD+18°1141	6.8	D	7.7	4 38.2	-0.4	-0.6	66	4 38.6	-0.5	-0.2	50
Apr.	30	1332	60 Cnc	5.7	D	10.6	23 59.0	-1.9	+0.4	95	24 10.4	-2.0	+1.0	79
	6	2118	α Lib	2.9	D	16.8	No occ.	—	—	...	3 02.4	+0.2	-1.6	165
	6	2117	8 Lib	5.3	R	16.8	Graze	—	—	...	3 35.9	-1.6	+2.2	243
	6	2118	α Lib	2.9	R	16.8	No occ.	—	—	...	3 38.9	-1.9	+2.7	234
	8	2436	81 B. Oph <i>f</i>	6.3	R	18.9	6 11.0	-0.7	-0.8	325	6 07.6	—	—	348
May	9	2969	β Cap	3.2	D	20.2	6 46.7	-1.3	+2.2	51	7 00.8	-1.4	+2.3	43
	9	2968	16 B. Cap	6.2	R	20.2	7 47.5	-1.7	+0.6	287	7 57.1	-1.8	+0.3	293
	9	2969	β Cap	3.2	R	20.2	7 57.4	-1.8	+0.6	284	8 07.4	-1.9	+0.3	290
	22	1011	BD+17°1306	7.4	D	3.2	1 04.6	0.0	-1.8	117	0 58.9	-0.1	-1.6	104
	23	1147	68 Gem	5.1	D	4.3	2 32.3	0.0	-1.2	92	Low	—	—	...
June	23	1145	67 Gem	6.7	D	4.3	2 36.1	+0.3	-2.0	136	Low	—	—	...
	25	1384	BD+10°1972	7.4	D	6.2	1 26.4	-1.3	-1.2	93	1 28.2	-1.2	-1.0	79
	31	2118	α Lib	2.9	R	12.2	No occ.	—	—	...	0 32.4	-2.1	+2.5	236
	4	2764	BD-18°5155	6.3	R	16.4	4 44.0	-1.5	+1.0	269	4 54.2	-1.6	+0.7	277
	21	1359	κ Cnc	5.1	D	3.7	1 55.0	-0.2	-1.2	91	Low	—	—	...

OCCULTATIONS VISIBLE AT WASHINGTON AND LONG. +72°30', LAT. +42°30'

Date	STAR			Ph.	Age of Moon	WASHINGTON				LONG. +72°30', LAT. +42°30'			
	Cat. No.	Name	Mag.			U. T.	<i>a</i>	<i>b</i>	<i>P</i>	U. T.	<i>a</i>	<i>b</i>	<i>P</i>
July 9	180	ζ Psc	5.6	R	d 22.0	h m	m	m	°	h m	m	m	°
9	181	BD+6°175	6.5	R	22.0	5 44.2	—	—	180	5 56.1	+0.2	+3.4	189
12	527	33 B. Tau	6.3	R	25.0	5 45.1	—	—	180	5 56.9	+0.2	+3.4	189
22	1792	BD-5°3513	7.1	D	5.3	Low	—	—	—	7 03.6	-0.3	+0.5	304
26	2345	BD-18°4260	6.9	D	9.4	2 08.5	-0.6	-2.4	147	2 02.8	-0.5	-2.1	139
						3 35.3	-1.3	+0.4	48	3 41.8	-0.9	+0.4	41
Aug. 5	136	171 B. Psc	6.3	R	19.5	7 05.8	-1.1	+2.6	216	7 19.9	-1.2	+2.4	219
9	620	193 B. Tau	6.3	R	23.6	7 01.7	-0.2	+1.6	255	7 08.9	-0.4	+1.6	259
25	2745	BD-18°5115	6.9	D	9.9	0 37.9	-2.1	+0.8	78	0 49.9	-1.9	+0.7	72
25	2755	BD-18°5134	6.6	D	10.0	2 49.7	-2.6	-1.8	124	2 55.0	-2.2	-1.6	120
25	2764	BD-18°5155	6.3	D	10.0	4 58.6	—	—	142	4 55.9	-2.0	-3.3	134
Sept. 9	1147	68 Gem	5.1	R	25.3	9 33.7	-0.3	+4.6	214	Sun	—	—	—
19	2408	BD-18°4320	6.9	D	5.5	1 54.8	-1.0	-1.5	104	Low	—	—	—
22	2871	BD-17°5699 <i>f</i>	7.1	D	8.6	4 11.7	-1.6	-2.2	114	4 10.7	-1.2	-1.9	108
Oct. 3	653	64 Tau	4.8	R	19.7	3 04.9	-0.6	0.0	310	3 08.0	-1.0	-0.3	317
5	934	BD+18°1112	6.4	R	21.7	4 54.7	-0.7	-0.3	314	4 56.9	-1.0	-0.8	323
5	944	124 H ¹ . Ori	5.7	R	21.8	6 50.4	-0.9	+2.0	248	7 01.7	-1.1	+1.7	256
8	1332	60 Cnc	5.7	R	24.8	Low	—	—	—	6 55.9	-0.1	+1.3	268
8	1341	α Cnc	4.3	R	24.9	7 37.1	—	—	349	No occ.	—	—	—
16	2497	166 B. Oph	6.6	D	4.1	23 53.6	-1.1	-0.7	76	23 55.4	-0.8	-0.7	71
18	2658	Y Sgr (<i>var.</i>)	5.4-6.2	D	5.1	0 49.0	-0.8	0.0	52	0 52.0	-0.6	0.0	48
21	3199	BD-9°5854	6.8	D	9.1	23 23.3	-1.4	+2.4	32	23 37.9	-1.3	+2.2	29
22	3216	BD-9°5876	6.6	D	9.3	Graze	—	—	—	4 33.0	-1.6	-3.5	124
23	3328	209 B. Aqr	7.0	D	10.2	2 26.7	-3.0	-1.4	108	2 34.6	-2.5	-1.3	104
23	3344	231 B. Aqr <i>m</i>	6.8	D	10.4	6 35.6	-0.4	-0.5	67	Low	—	—	—
24	3460	12 Psc	7.1	D	11.3	3 27.5	-2.6	-1.0	98	3 35.2	-2.2	-0.9	93
30	620	193 B. Tau	6.3	R	17.3	4 05.2	-2.0	0.0	295	4 13.9	-2.2	-0.6	302
30	648	δ Tau	3.9	D	17.5	10 06.1	-1.4	-0.5	74	10 11.2	-1.3	-0.1	59
Nov. 4	1309	A ¹ Cnc	5.7	R	22.5	9 47.6	-1.8	-1.1	305	9 50.2	-1.5	-1.9	322
13	2571	6 G. Sgr	6.9	D	2.6	Sun	—	—	—	22 05.7	-1.3	-1.3	101
14	2745	BD-18°5115	6.9	D	3.7	22 52.0	-2.3	-2.8	131	22 52.6	-1.9	-2.4	125
18	3163	BD-10°5714	7.3	D	6.7	0 03.3	-2.2	-0.3	84	0 10.9	-1.8	-0.5	81
29	1029	26 Gem	5.1	R	18.1	9 21.7	-1.7	-1.1	275	9 23.7	-1.3	-1.7	290
Dec. 4	1611	p ⁴ Leo	5.7	R	23.1	9 48.2	-1.9	+0.5	276	9 56.7	-1.7	-0.3	292
13	2969	β Cap	3.2	D	3.2	22 45.4	—	—	3	Graze	—	—	—
13	2969	β Cap	3.2	R	3.2	23 13.3	—	—	317	Graze	—	—	—
16	3248	128 B. Aqr	6.6	D	5.3	1 20.1	-0.4	+1.0	31	1 25.4	-0.2	+1.3	22
18	3502	BD-0°4566	7.4	D	7.4	3 00.1	-0.7	+0.8	37	3 06.2	-0.4	+1.3	25
19	180	ζ Psc	5.6	D	9.3	23 40.5	—	—	8	23 58.4	—	—	1
19	181	BD+6°175	6.5	D	9.3	23 41.6	—	—	8	23 59.4	—	—	1
21	301	34 B. Ari	6.8	D	10.3	1 16.6	-2.0	+1.3	59	1 29.9	-1.8	+1.3	52
23	653	64 Tau	4.8	D	13.2	Sun	—	—	—	21 40.5	+0.3	+2.6	34
27	1106	λ Gem	3.6	D	16.6	6 55.1	—	—	175	6 43.1	-1.3	-3.1	147
27	1106	λ Gem	3.6	R	16.6	7 23.1	—	—	213	7 43.0	-2.2	+0.5	241
28	1234	30 B. Cnc	6.1	R	17.5	7 01.2	-2.1	-0.6	281	7 06.7	-1.7	-1.3	297
29	1341	α Cnc	4.3	D	18.4	2 24.3	-0.6	-0.6	140	2 26.2	-0.6	+0.1	129
29	1341	α Cnc	4.3	R	18.4	3 14.5	-0.6	+2.4	243	3 25.6	-0.8	+1.9	256

OCCULTATIONS VISIBLE IN LONG. +98°0', LAT. +31°0' AND LONG. +91°0',
LAT. +40°0'

Date		STAR			Ph.	Age of Moon	LONG. +98°0', LAT. +31°0'				LONG. +91°0', LAT. +40°0'					
		Cat. No.	Name	Mag.			U. T.	<i>a</i>	<i>b</i>	<i>P</i>	U. T.	<i>a</i>	<i>b</i>	<i>P</i>		
Jan.	1	391	BD+14°439	7.4	D	10.8	h	m	m	m	°	h	m	m	m	°
	1	403	o Ari	5.8	D	10.9	Sun	3 56.3	-2.4	-0.1	81	0 12.1	-1.3	+2.2	51	
	1	413	BD+14°469	6.8	D	10.9	6 18.5	-1.3	-0.6	79	4 13.9	-1.7	+0.8	52		
	3	668	ε Tau	3.6	D	12.9	1 47.0	-1.0	+3.2	36	6 26.0	-1.0	+0.6	42		
	8	1397	ω Leo <i>m</i>	5.5	R	18.1	No occ.				No occ.					
												8 02.0	-2.7	+1.7	244	
	12	1887	BD-8°3495	6.4	R	22.1	7 55.6	-0.9	+1.4	262	8 08.0	-0.7	+0.2	300		
	12	1925	α Vir	1.2	D	22.4	16 47.6	-0.8	-1.7	117	16 38.8	-0.6	-1.4	99		
	12	1925	α Vir	1.2	R	22.4	17 49.4	-0.3	-1.1	273	Low					
	25	6	BD+2°4752	6.9	D	5.2	3 40.0	-0.3	+1.3	31	No occ.					
Feb.	26	98	60 Psc	6.2	D	6.1	1 15.5	—	—	126	1 10.6	-1.7	-1.3	91		
	26	103	62 Psc	6.1	D	6.1	2 26.8	—	—	9	No occ.					
	29	466	BD+15°447	7.3	D	9.2	1 35.1	-2.3	+1.7	54	2 12.1	—	—	18		
	30	617	188 B. Tau	6.6	D	10.3	5 17.0	-1.5	-0.8	87	5 24.4	-1.3	+0.4	50		
	1	904	BD+18°1040	7.1	D	12.2	No occ.				2 50.3	—	—	152		
	2	1072	110 B. Gem	6.2	D	13.3	5 02.3	-2.4	-0.2	91	5 26.0	-2.7	+2.2	48		
	10	2118	α Lib	2.9	D	21.5	9 10.9	-1.3	+0.2	110	9 29.5	-2.0	+1.4	74		
	10	2117	8 Lib	5.3	R	21.5	10 19.4	-1.7	-0.4	299	10 20.5	-0.9	-1.5	334		
	10	2118	α Lib	2.9	R	21.5	10 28.7	-1.8	-0.3	294	10 32.6	-1.2	-1.2	327		
	26	577	148 B. Tau	6.0	D	7.5	Low				5 35.0	+0.1	-1.6	106		
Mar.	27	697	BD+18°661 (<i>var.</i>)	7.2-7.4	D	8.4	Sun				0 31.0	-2.3	-0.8	103		
	27	710	BD+18°684	7.1	D	8.5	4 06.4	-1.2	-1.5	103	4 06.2	-1.2	-0.5	68		
	27	718	302 B. Tau	6.1	D	8.6	5 56.6	-0.4	-1.0	88	5 54.7	-0.6	-0.1	53		
	28	862	BD+18°920	7.5	D	9.6	6 40.1	-0.7	-0.5	72	6 49.5	—	—	23		
	28	863	127 Tau	6.7	D	9.6	6 52.4	-0.6	-0.4	70	Graze					
	1	1029	26 Gem	5.1	D	10.7	8 25.2	+0.3	-2.0	136	8 08.5	+0.1	-1.5	107		
	2	1147	68 Gem	5.1	D	11.5	No occ.				5 28.0	—	—	171		
	3	1281	84 B. Cnc	6.4	D	12.6	5 51.7	-2.8	+0.6	68	No occ.					
	4	1397	ω Leo <i>m</i>	5.5	D	13.5	No occ.				4 07.6	-0.8	-3.4	168		
	23	284	BD+10°257	7.4	D	2.6	1 52.0	+0.1	-3.6	135	1 33.1	-0.1	-1.4	93		
Apr.	26	658	68 Tau	4.2	D	5.7	No occ.				3 07.7	0.0	-3.0	137		
	26	663	BD+17°724	6.9	D	5.7	3 54.1	-0.3	-1.3	99	3 48.1	-0.4	-0.6	66		
	27	800	BD+18°831	7.5	D	6.7	4 47.8	-0.7	-0.1	61	No occ.					
	28	943	19 B. (Gem)	6.2	D	7.7	3 34.3	—	—	41	No occ.					
	28	951	BD+18°1141	6.8	D	7.7	4 36.4	-0.6	-1.6	111	4 29.7	-0.7	-0.9	78		
	29	1091	BD+17°1518	6.7	D	8.8	4 56.2	-1.4	-0.4	75	Graze					
	30	1212	BD+15°1734	7.1	D	9.7	1 25.9	-2.6	+0.8	80	No occ.					
	30	1237	BD+14°1850	6.4	D	9.9	7 16.4	-0.4	-1.1	94	7 11.5	-0.5	-0.6	65		
	31	1359	κ Cnc	5.1	D	10.8	6 47.5	-1.3	-0.7	82	6 57.2	—	—	37		
	1	1482	14 Sex	6.3	D	11.9	No occ.				8 23.0	+0.1	-3.1	169		
May	8	2436	81 B. Oph <i>f</i>	6.3	R	18.9	Low				6 03.2	-0.4	0.0	310		
	10	2764	BD-18°5155	6.3	R	21.0	10 28.2	-2.3	+2.3	226	Sun					
	26	1183	BD+15°1676	7.2	D	7.0	5 01.4	+0.5	-3.4	165	4 38.0	-0.1	-2.0	129		
	27	1318	A ² Cnc	5.7	D	8.1	5 45.2	—	—	43	No occ.					
	9	2968	16 B. Cap	6.2	R	20.2	7 14.6	-0.8	+1.3	263	7 30.2	-1.0	+0.8	287		
	9	2969	β Cap	3.2	R	20.2	7 22.4	-0.9	+1.3	261	7 38.9	-1.0	+0.9	285		
	23	1145	67 Gem	6.7	D	4.3	No occ.				2 37.0	+0.2	-2.6	148		
23	1147	68 Gem	5.1	D	4.3	2 42.1	-0.2	-2.1	131	2 28.3	-0.3	-1.5	102			
29	1887	BD-8°3495	6.4	D	10.5	8 01.1	-0.7	-2.6	149	Low						

OCCULTATIONS VISIBLE IN LONG. $+98^{\circ}0'$, LAT. $+31^{\circ}0'$ AND LONG. $+91^{\circ}0'$,
LAT. $+40^{\circ}0'$

Date	STAR			Ph.	Age of Moon	LONG. $+98^{\circ}0'$, LAT. $+31^{\circ}0'$					LONG. $+91^{\circ}0'$, LAT. $+40^{\circ}0'$				
	Cat. No.	Name	Mag.			U. T.	<i>a</i>	<i>b</i>	<i>P</i>		U. T.	<i>a</i>	<i>b</i>	<i>P</i>	
June	4	2764 BD-18°5155	6.3	R	d	h m	m	m	°		h m	m	m	°	
	7	3185 <i>c</i> ¹ Cap	5.3	R	16.4	Low	—	—	—		4 27.7	-1.0	+1.3	264	
	7	3187 <i>c</i> ² Cap	6.2	R	19.6	9 22.3	-3.0	-0.8	299		Graze	—	—	—	
	21	1359 <i>κ</i> Cnc	5.1	D	19.6	10 13.1	-1.9	+2.2	221		Sun	—	—	—	
	25	1843 339 B. Vir	6.9	D	3.7	2 00.0	-0.5	-1.8	125		1 49.0	-0.5	-1.4	99	
July	27	2105 5 Lib	6.6	D	7.9	5 44.2	-0.7	-1.3	103		Low	—	—	—	
	28	2232 174 B. Lib	7.2	D	9.9	7 18.5	-0.8	-1.1	93		Low	—	—	—	
	20	1564 34 Sex <i>m.</i>	6.6	D	10.8	3 51.7	—	—	48		No occ.	—	—	—	
	26	2345 BD-18°4260	6.9	D	3.3	2 28.8	-0.5	-0.8	82		Low	—	—	—	
	29	2826 <i>ρ</i> Sgr	4.0	D	9.4	2 48.3	-2.6	+0.7	69		3 13.3	-2.0	+1.3	41	
Aug.	5	136 171 B. Psc	6.3	R	12.6	8 35.2	-2.5	-1.7	136		8 25.3	-1.4	-1.9	110	
	21	2159 <i>ν</i> Lib	5.3	D	19.5	6 28.4	-0.5	+2.4	223		6 53.9	-0.9	+2.1	235	
	22	2301 BD-18°4228	6.8	D	5.9	2 51.3	-1.6	-2.3	136		2 43.1	-1.1	-1.7	116	
	22	2313 BD-17°4494	7.0	D	7.0	3 02.9	-2.1	-3.1	146		2 55.0	-1.5	-1.9	124	
	25	2755 BD-18°5134	6.6	D	7.0	4 31.6	-0.8	-0.3	67		Low	—	—	—	
Sept.	25	2764 BD-18°5155	6.3	D	10.0	2 05.8	-2.5	-1.7	135		2 14.9	-2.2	-0.4	112	
	9	1147 68 Gem	5.1	R	10.0	4 21.4	—	—	135		4 22.7	-2.2	-1.5	114	
	19	2408 BD-18°4320	6.9	D	25.3	No occ.	—	—	—		9 33.5	-0.2	+2.6	233	
	22	2871 BD-17°5699 <i>f.</i>	7.1	D	5.5	1 34.6	-2.0	-1.3	108		1 36.5	-1.4	-1.0	92	
	23	3002 45 B. Cap	6.2	D	8.6	3 41.7	-2.7	-1.4	108		3 46.9	-1.8	-1.0	92	
Oct.	5	944 124 H ¹ . Ori	5.7	R	9.7	6 02.9	-0.1	+2.4	16		No occ.	—	—	—	
	5	970 292 B. (Ori)	6.5	R	21.8	6 26.2	0.0	+1.8	243		6 42.7	-0.5	+1.5	263	
	6	1106 <i>λ</i> Gem	3.6	D	21.9	No occ.	—	—	—		10 45.5	-2.2	+3.4	223	
	7	1234 30 B. Cnc	6.1	R	23.0	11 20.3	-2.3	-1.9	134		11 28.5	-2.1	0.0	99	
	16	2345 BD-18°4260	6.9	D	24.0	11 18.6	-1.9	-1.7	318		No occ.	—	—	—	
	18	2658 <i>Y</i> Sgr (<i>var.</i>)	5.4-6.2	D	3.1	No occ.	—	—	—		0 00.2	—	—	161	
	19	2830 BD-17°5611	6.9	D	5.1	Sun	—	—	—		0 37.0	-1.0	+1.1	33	
	22	3216 BD-9°5876	6.6	D	6.3	3 40.6	-1.0	-0.6	78		Low	—	—	—	
	23	3328 209 B. Aqr	7.0	D	9.3	4 06.3	—	—	131		4 03.6	-2.2	-1.7	104	
	23	3344 231 B. Aqr <i>m.</i>	6.8	D	10.2	1 27.1	-2.6	+0.5	96		1 49.9	-2.2	+0.7	83	
	24	3460 12 Psc	7.1	D	10.4	6 21.2	-1.5	-0.5	77		6 26.9	-0.8	0.0	54	
	30	620 193 B. Tau	6.3	R	11.3	2 29.6	-2.6	+0.8	86		2 53.9	-2.1	+0.8	74	
	30	648 <i>δ</i> Tau	3.9	D	17.3	3 31.4	-1.1	0.0	299		3 35.7	—	—	327	
	30	648 <i>δ</i> Tau	3.9	R	17.5	9 33.5	-2.5	-1.6	109		9 41.7	-2.0	-0.2	76	
	30	653 64 Tau	4.8	R	17.5	10 58.4	-2.0	+0.4	243		11 03.8	-1.2	-1.5	278	
Nov.	4	1309 <i>A</i> ¹ Cnc	5.7	R	17.6	11 29.1	—	—	211		11 45.0	-1.1	-0.7	254	
	17	3163 BD-10°5714	7.3	D	22.5	9 09.8	-1.5	+1.0	270		9 23.4	-1.5	-0.4	303	
	18	3185 <i>c</i> ¹ Cap	5.3	D	6.7	Sun	—	—	—		23 34.7	-2.0	+0.9	64	
	18	3184 117 G. Cap	7.1	D	6.9	5 15.2	-0.3	+0.3	50		Low	—	—	—	
	29	1029 26 Gem	5.1	R	6.9	5 17.8	-0.1	+0.8	38		No occ.	—	—	—	
Dec.	4	1611 <i>p</i> ⁴ Leo	5.7	R	18.1	8 23.9	—	—	226		8 53.0	-2.2	-0.2	267	
	16	3248 128 B. Aqr	6.6	D	23.1	No occ.	—	—	—		9 25.2	-1.5	+1.4	265	
	18	3502 BD-0°4566	7.4	D	5.3	0 54.0	-1.1	+1.8	30		1 18.0	—	—	4	
	21	301 34 B. Ari	6.8	D	7.4	2 29.3	-1.6	+1.3	45		2 51.5	-0.7	+2.1	19	
	24	684 119 H ¹ . Tau <i>m.</i>	6.2	D	10.3	0 23.6	-1.4	+2.2	52		0 55.3	-1.3	+2.6	37	
	28	1234 30 B. Cnc	6.1	R	13.4	2 36.4	-0.8	+4.0	28		No occ.	—	—	—	
	29	1341 <i>α</i> Cnc	4.3	R	17.5	6 04.6	-2.1	+2.8	238		6 31.8	-2.0	+0.3	276	
	29	1364 209 B. Cnc	6.5	R	18.4	Low	—	—	—		3 11.5	-0.2	+1.8	253	
	30	1465 89 B. Leo	6.3	R	18.7	9 31.0	-1.1	-3.9	342		No occ.	—	—	—	
	30	1468 <i>π</i> Leo	4.9	R	19.6	6 14.4	—	—	352		No occ.	—	—	—	
						7 51.4	-1.4	-2.0	328		No occ.	—	—	—	

Date		STAR			Ph.	Age of Moon	LONG. +123°06', LAT. +49°30'				LONG. +120°0', LAT. +36°0'			
		Cat. No.	Name	Mag.			U. T.	a	b	P	U. T.	a	b	P
Jan.	1	403	ο Ari	5.8	D	10.9	No occ.	...	...	...	h m	m	m	°
	1	413	BD+14°469	6.8	D	10.9	No occ.	...	...	...	3 14.0	-1.6	+2.5	43
	3	718	302 B. Tau	6.1	D	13.2	11 17.4	+0.1	-2.6	135	No occ.	...	...	...
	8	1397	ω Leo m.	5.5	R	18.1	7 21.0	-1.1	+1.9	254	No occ.	...	...	...
	12	1925	α Vir	1.2	D	22.4	15 52.6	-1.5	-0.8	90	16 12.1	-1.6	-1.4	111
	12	1925	α Vir	1.2	R	22.4	17 00.1	-1.0	-1.8	310	17 26.6	-1.1	-1.5	288
	15	2322	ν Sco m.	4.3	D	25.4	15 06.8	—	—	40	Sun	...	...	...
	16	2456	109 B. Oph	6.2	R	26.3	Low	...	...	...	13 27.9	-2.0	+3.5	221
	30	617	188 B. Tau	6.6	D	10.3	4 48.0	—	—	18	4 31.7	-2.2	+0.2	76
	30	629	BD+17°703	7.5	D	10.4	8 30.2	-0.5	-1.5	90	8 55.9	+0.1	-2.3	127
Feb.	30	643	BD+18°629	6.7	D	10.5	10 13.9	-0.2	-0.5	52	Low	...	...	...
	1	904	BD+18°1040	7.1	D	12.2	1 51.2	-0.9	+1.1	97	1 56.8	—	—	152
	1	943	19 B. (Gem)	6.2	D	12.5	9 52.3	-0.9	-0.6	61	10 07.4	-0.5	-1.2	94
	2	1072	110 B. Gem	6.2	D	13.3	No occ.	...	...	...	4 15.9	-1.8	+1.1	80
	2	1106	λ Gem	3.6	D	13.6	12 27.4	+0.1	-1.6	109	Low	...	...	...
	10	2117	8 Lib	5.3	R	21.5	Low	...	...	...	9 52.0	-0.9	+0.7	283
	10	2118	α Lib	2.9	R	21.5	Low	...	...	...	9 59.0	-1.0	+0.8	278
	26	577	148 B. Tau	6.0	D	7.5	5 06.1	-0.9	-1.7	101	5 47.8	—	—	156
	27	710	BD+18°684	7.1	D	8.5	3 17.4	-1.7	+1.4	50	3 20.2	-2.3	-0.9	98
	27	718	302 B. Tau	6.1	D	8.6	5 21.0	-1.4	+0.3	51	5 32.6	-1.3	-1.2	94
Mar.	27	726	305 B. Tau	6.8	D	8.6	6 39.2	-1.0	-0.3	54	6 52.7	-0.6	-1.2	91
	27	730	i Tau	5.1	D	8.6	No occ.	...	...	...	8 17.6	-0.5	+0.2	49
	28	862	BD+18°920	7.5	D	9.6	6 10.3	—	—	34	6 13.4	-1.5	-0.7	82
	28	863	127 Tau	6.7	D	9.6	6 24.8	—	—	33	6 27.8	-1.4	-0.7	81
	28	871	BD+18°950	6.9	D	9.6	7 21.4	-0.7	-1.4	91	7 46.3	-0.3	-2.1	123
	1	1029	26 Gem	5.1	D	10.7	7 43.3	-0.7	-1.9	115	8 16.3	0.0	-3.0	149
	2	1147	68 Gem	5.1	D	11.5	4 27.7	—	—	169	No occ.	...	...	...
	3	1281	84 B. Cnc	6.4	D	12.6	No occ.	...	...	...	4 58.0	-2.3	+0.8	81
	4	1397	ω Leo m.	5.5	D	13.5	3 18.4	-0.7	-0.8	149	No occ.	...	...	...
	14	2826	ρ Sgr	4.0	D	23.9	12 54.8	-1.1	+1.6	72	12 40.4	-1.3	+0.9	96
25	527	33 B. Tau	6.3	D	4.8	5 18.2	+0.2	-2.6	127	No occ.	...	...	...	
26	663	BD+17°724	6.9	D	5.7	3 14.3	-1.3	-0.2	61	3 30.7	-1.2	-1.6	103	
26	684	119 H ¹ Tau m.	6.2	D	5.8	6 33.5	+0.1	-1.7	104	Low	...	...	...	
27	800	BD+18°831	7.5	D	6.7	Graze	...	...	...	4 22.3	-1.5	-0.4	71	
28	951	BD+18°1141	6.8	D	7.7	3 42.5	-1.6	-0.5	82	4 04.3	-1.4	-2.1	120	
28	970	292 B. (Ori)	6.5	D	7.8	7 07.3	+0.3	-3.0	153	No occ.	...	...	...	
29	1091	BD+17°1518	6.7	D	8.8	4 15.8	—	—	37	4 13.8	-2.1	-0.6	88	
29	1106	λ Gem	3.6	D	8.9	7 34.9	-1.0	-0.4	53	7 47.6	-0.5	-1.0	85	

OCCULTATIONS VISIBLE IN LONG. $+123^{\circ}06'$, LAT. $+49^{\circ}30'$ AND LONG. $+120^{\circ}0'$,
LAT. $+36^{\circ}0'$

Date	STAR			Ph.	Age of Moon	LONG. $+123^{\circ}06'$, LAT. $+49^{\circ}30'$					LONG. $+120^{\circ}0'$, LAT. $+36^{\circ}0'$				
	Cat. No.	Name	Mag.			U. T.	<i>a</i>	<i>b</i>	<i>P</i>		U. T.	<i>a</i>	<i>b</i>	<i>P</i>	
					d	h	m	m	m	°	h	m	m	m	°
Mar. 30	1237	BD+14°1850	6.4	D	9.9	6 34.0	-1.3	-0.8	78		6 53.8	-1.1	-1.5	107	
31	1359	κ Cnc	5.1	D	10.8	5 57.4	-2.0	+0.4	64		6 07.9	-1.8	-1.0	100	
Apr. 10	2764	BD-18°5155	6.3	R	21.0	Low					9 58.2	-1.5	+2.5	227	
23	764	<i>m</i> Tau <i>m.</i>	5.0	D	4.0	3 41.0	-0.9	-0.5	56		3 55.1	-0.5	-1.2	91	
25	1073	41 H ¹ . Gem	6.0	D	6.1	7 13.3	+0.3	-1.8	124		Low				
26	1183	BD+15°1676	7.2	D	7.0	4 02.5	-0.7	-2.5	141		No occ.				
27	1318	A ² Cnc	5.7	D	8.1	No occ.					5 07.9	-2.1	0.0	67	
29	1566	36 Sex	6.6	D	10.2	9 26.6	-0.2	-1.8	120		Low				
May 22	1029	26 Gem	5.1	D	3.3	Sun					3 57.0	-0.2	-1.3	99	
25	1397	ω Leo <i>m.</i>	5.5	D	6.4	5 27.8	-0.9	-1.1	75		5 47.0	-0.6	-1.4	99	
29	1887	BD-8°3495	6.4	D	10.5	7 01.9	-1.2	-1.4	117		7 28.6	-1.2	-2.1	139	
June 7	3187	<i>c</i> ² Cap	6.2	R	19.6	9 58.1	-1.2	+1.3	274		9 43.0	-1.5	+1.6	250	
22	1489	16 Sex	6.8	D	4.9	No occ.					5 33.7	-0.4	-0.4	63	
25	1843	339 B. Vir	6.9	D	7.9	Sun					5 13.4	-1.5	-1.2	99	
27	2105	5 Lib	6.6	D	9.9	6 41.5	-1.5	+0.3	44		6 48.2	-1.7	-0.5	75	
29	2401	131 B. (Sco)	5.6	D	11.9	5 12.9	-1.0	-0.7	149		No occ.				
July 7	3508	21 Psc	5.8	R	20.1	Graze					10 04.2	-2.0	+0.8	280	
25	2211	33 Lib	7.2	D	8.5	6 44.3	-0.9	-1.2	87		7 06.7	-1.1	-1.7	114	
29	2826	ρ Sgr	4.0	D	12.6	7 32.5	-1.4	+0.3	58		7 35.9	-2.2	-0.2	85	
Aug. 3	3467	13 Psc	6.5	R	17.6	8 42.4	-0.8	+2.3	209		No occ.				
5	136	171 B. Psc	6.3	R	19.5	6 51.7	-0.2	+1.5	273		Low				
9	648	δ Tau	3.9	D	23.8	11 14.8	-0.6	+1.7	79		11 02.3	-1.3	+0.2	117	
9	648	δ Tau	3.9	R	23.8	Sun					11 57.2	-0.5	+3.2	215	
9	658	68 Tau	4.2	D	23.8	Sun					12 35.0	-1.3	+2.0	62	
11	934	BD+18°1112	6.4	R	25.8	Sun					12 09.2	0.0	+2.8	222	
21	2170	88 B. Lib	6.8	D	6.0	No occ.					5 05.8	-0.7	+0.3	48	
22	2313	BD-17°4494	7.0	D	7.0	No occ.					4 09.2	—	—	34	
22	2316	73 B. Sco	6.4	D	7.0	No occ.					5 01.2	-1.2	+0.1	56	
23	2463	132 B. Oph	6.9	D	8.1	6 06.8	-0.6	+0.4	33		6 11.0	-1.1	-0.4	70	
24	2611	BD-19°4832	6.8	D	9.1	4 44.4	-1.8	-0.9	120		No occ.				
25	2764	BD-18°5155	6.3	D	10.0	Sun					3 17.8	-2.1	+0.1	106	
Sept. 1	104	147 B. Psc	5.8	R	17.2	8 25.9	-0.9	+2.2	217		Graze				
8	1029	26 Gem	5.1	R	24.4	11 20.8	-1.0	-0.4	322		11 17.9	-0.8	+1.0	274	
10	1281	84 B. Cnc	6.4	R	26.4	Low					11 25.4	-0.2	+0.3	298	
18	2259	194 B. Lib	6.7	D	4.6	Sun					3 18.1	-1.5	-2.4	136	
20	2571	6 G. Sgr	6.9	D	6.7	5 01.6	-1.1	-1.2	93		5 29.2	-1.7	-2.7	130	
20	2573	290 B. (Oph)	7.3	D	6.7	No occ.					5 50.6	-0.3	+0.6	38	
21	2731	BD-18°5079	6.5	D	7.7	5 16.4	-1.2	-0.8	79		5 37.8	-1.9	-1.9	115	
22	2871	BD-17°5699 <i>f.</i>	7.1	D	8.6	2 54.9	-1.5	+1.2	49		2 46.4	-2.2	+0.8	74	
Oct. 4	814	115 Tau	5.3	R	20.9	9 14.1	-0.6	+2.5	234		No occ.				

OCCULTATIONS VISIBLE IN LONG. +123°06', LAT. +49°30' AND LONG. +120°0',
LAT. +36°0'

Date		STAR			Ph.	Age of Moon	LONG. +123°06', LAT. +49°30'				LONG. +120°0', LAT. +36°0'			
		Cat. No.	Name	Mag.			U. T.	a	b	P	U. T.	a	b	P
Oct.	4	832	119 Tau	4.7	R	d	h	m	m	°	h	m	m	°
	5	970	292 B. (Ori)	6.5	R	21.0	No occ.				12 16.1	—	—	321
	6	1106	λ Gem	3.6	D	21.9	10 16.7	-1.0	+1.4	270	9 51.1	-0.6	+3.3	223
	6	1106	λ Gem	3.6	R	23.0	10 54.5	-0.7	+2.4	62	10 37.6	-1.2	+0.5	107
	7	1237	BD+14°1850	6.4	R	23.0	11 54.9	-1.3	-0.4	309	11 54.1	-1.7	+1.3	262
						24.0	12 05.3	-1.0	+1.6	261	No occ.			
	8	1359	κ Cnc	5.1	R	25.0	12 23.5	-0.7	+3.0	236	No occ.			
	16	2361	χ Oph	4.8	D	3.2	No occ.				2 59.3	-0.3	+0.3	47
	18	2680	95 B. Sgr	5.8	D	5.3	Low				4 38.3	-0.8	-0.7	77
	19	2826	ρ Sgr	4.0	D	6.2	1 33.9	-2.0	-0.9	129	No occ.			
	19	2830	BD-17°5611	6.9	D	6.3	No occ.				3 16.4	-1.1	+1.2	35
	20	2968	16 B. Cap	6.2	D	7.3	4 58.9	-0.9	-0.1	49	5 08.2	-1.6	-0.9	87
	20	2969	β Cap	3.2	D	7.3	5 06.1	-0.9	-0.2	53	5 17.3	-1.6	-1.1	91
	20	2969	β Cap	3.2	R	7.3	6 13.4	-0.9	-1.4	269	6 24.4	-0.4	+0.3	227
	22	3216	BD-9°5876	6.6	D	9.3	3 08.4	-1.3	+1.5	44	2 56.0	-2.2	+1.0	73
	23	3344	231 B. Aqr m.	6.8	D	10.4	No occ.				5 51.9	-1.3	+1.9	31
	24	3460	12 Psc	7.1	D	11.3	2 30.5	-0.6	+2.7	22	1 59.8	-1.1	+2.2	51
	24	3467	13 Psc	6.5	D	11.3	3 49.0	-1.8	+0.8	96	No occ.			
	30	648	δ Tau	3.9	D	17.5	8 57.4	-1.1	+3.4	31	8 35.0	-2.2	+1.0	80
	30	648	δ Tau	3.9	R	17.5	9 52.4	-2.1	-2.2	310	10 09.7	-2.4	+0.4	259
	30	653	64 Tau	4.8	R	17.6	10 50.0	-1.7	-0.6	274	10 50.3	-2.3	+2.0	226
Nov.	1	934	BD+18°1112	6.4	R	19.6	12 51.6	-1.4	-2.3	311	13 17.5	-2.0	-0.7	269
	4	1309	A ¹ Cnc	5.7	R	22.5	Graze				8 51.8	-0.6	+0.4	294
	4	1318	A ² Cnc	5.7	R	22.6	11 11.6	-1.1	+1.7	259	No occ.			
	8	1787	162 B. Vir	6.0	R	26.7	No occ.				12 31.4	-0.2	-1.1	331
	14	2596	BD-19°4800	7.3	D	2.8	Low				2 28.6	-0.5	0.0	54
	17	3051	87 B. (Cap)	7.0	D	5.8	2 51.2	-1.4	-0.4	74	3 10.0	-2.6	-2.1	114
	18	3185	c ¹ Cap	5.3	D	6.9	No occ.				5 20.6	—	—	355
	18	3187	c ² Cap	6.2	D	6.9	5 21.0	-0.5	+0.3	36	5 26.6	-1.1	-0.8	80
	22	104	147 B. Psc	5.8	D	10.9	2 24.9	-1.2	+1.5	78	2 16.8	-2.6	0.0	113
	22	136	171 B. Psc	6.3	D	11.1	10 29.6	-0.3	-1.1	75	Low			
	29	1029	26 Gem	5.1	R	18.1	7 54.0	-1.4	+0.1	297	7 46.8	-1.7	+1.8	251
	30	1147	68 Gem	5.1	R	19.0	6 58.0	-0.5	+2.4	242	No occ.			
	1	1281	84 B. Cnc	6.4	R	20.2	11 18.4	-1.4	-1.2	313	11 32.8	-2.4	+0.1	272
	3	1519	155 B. (Leo)	6.5	R	22.3	13 45.1	—	—	6	Sun			
	5	1744	46 B. Vir	6.5	R	24.2	12 10.6	-0.9	+0.9	283	11 51.1	—	—	232
Dec.	27	1106	λ Gem	3.6	D	16.6	5 16.9	-0.9	+0.3	123	No occ.			
	27	1106	λ Gem	3.6	R	16.6	6 19.6	-1.1	+2.1	246	No occ.			
	28	1234	30 B. Cnc	6.1	R	17.5	5 51.5	-0.8	+0.2	309	5 43.7	-0.9	+1.4	263
	29	1364	209 B. Cnc.	6.5	R	18.7	No occ.				8 45.0	-1.4	-2.7	335
	30	1468	π Leo	4.9	R	19.6	No occ.				7 17.0	-0.8	-2.2	340

PART IV

PHYSICAL EPHEMERIDES

OF THE

SUN, MOON, AND PLANETS

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN

FOR 0^h UNIVERSAL TIME

Date		<i>P</i>	<i>B_o</i>	<i>L_o</i>	Date		<i>P</i>	<i>B_o</i>	<i>L_o</i>
		°	°	°			°	°	°
Jan.	1	+ 2.25	-3.05	157.49	Feb.	16	-17.65	-6.88	271.78
	2	1.76	3.16	144.32		17	17.98	6.92	258.61
	3	1.27	3.28	131.15		18	18.30	6.96	245.45
	4	0.79	3.39	117.98		19	18.62	6.99	232.28
	5	+ 0.30	3.50	104.81		20	18.94	7.02	219.11
	6	- 0.18	-3.62	91.64		21	-19.25	-7.05	205.94
	7	0.67	3.73	78.47		22	19.55	7.08	192.77
	8	1.15	3.84	65.30		23	19.84	7.11	179.60
	9	1.64	3.95	52.13		24	20.13	7.13	166.43
	10	2.12	4.05	38.96		25	20.41	7.15	153.26
	11	- 2.60	-4.16	25.79		26	-20.69	-7.17	140.09
	12	3.08	4.27	12.63		27	20.96	7.19	126.91
	13	3.55	4.37	359.46		28	21.23	7.21	113.74
	14	4.03	4.47	346.29	Mar.	1	21.49	7.22	100.57
	15	4.50	4.57	333.12		2	21.74	7.23	87.40
	16	- 4.97	-4.67	319.96		3	-21.98	-7.24	74.22
	17	5.43	4.77	306.79		4	22.22	7.24	61.05
	18	5.90	4.86	293.62		5	22.46	7.25	47.87
	19	6.36	4.96	280.45		6	22.68	7.25	34.70
	20	6.82	5.05	267.29		7	22.90	7.25	21.52
	21	- 7.28	-5.14	254.12		8	-23.12	-7.25	8.35
	22	7.73	5.23	240.95		9	23.32	7.24	355.17
	23	8.18	5.32	227.79		10	23.52	7.23	342.00
	24	8.62	5.41	214.62		11	23.72	7.22	328.82
	25	9.07	5.49	201.45		12	23.91	7.21	315.64
	26	- 9.50	-5.58	188.29		13	-24.09	-7.20	302.46
	27	9.94	5.66	175.12		14	24.26	7.18	289.28
	28	10.37	5.74	161.95		15	24.43	7.17	276.10
	29	10.80	5.82	148.79		16	24.59	7.15	262.92
	30	11.22	5.89	135.62		17	24.75	7.12	249.74
	31	-11.63	-5.97	122.46		18	-24.89	-7.10	236.56
Feb.	1	12.05	6.04	109.29		19	25.03	7.07	223.38
	2	12.46	6.11	96.12		20	25.16	7.04	210.19
	3	12.86	6.18	82.96		21	25.29	7.01	197.01
	4	13.26	6.24	69.79		22	25.41	6.98	183.82
	5	-13.65	-6.31	56.62		23	-25.52	-6.94	170.64
	6	14.04	6.37	43.46		24	25.63	6.91	157.45
	7	14.43	6.43	30.29		25	25.73	6.87	144.26
	8	14.81	6.49	17.12		26	25.82	6.83	131.08
	9	15.18	6.54	3.96		27	25.90	6.78	117.89
	10	-15.55	-6.60	350.79		28	-25.98	-6.74	104.70
	11	15.91	6.65	337.62		29	26.05	6.69	91.51
	12	16.27	6.70	324.46		30	26.11	6.64	78.32
	13	16.62	6.75	311.29		31	26.17	6.59	65.13
	14	16.97	6.79	298.12	Apr.	1	26.22	6.54	51.94
	15	-17.31	-6.84	284.95		2	-26.26	-6.48	38.74
	16	-17.65	-6.88	271.78		3	-26.29	-6.42	25.55

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN
FOR 0^h UNIVERSAL TIME

Date		<i>P</i>	<i>B</i> ₀	<i>L</i> ₀	Date		<i>P</i>	<i>B</i> ₀	<i>L</i> ₀
		°	°	°			°	°	°
Apr.	1	-26.22	-6.54	51.94	May	17	-20.60	-2.42	164.25
	2	26.26	6.48	38.74		18	20.31	2.31	151.02
	3	26.29	6.42	25.55		19	20.02	2.19	137.79
	4	26.32	6.36	12.35		20	19.72	2.08	124.56
	5	26.34	6.30	359.16		21	19.41	1.96	111.34
	6	-26.36	-6.24	345.96		22	-19.10	-1.84	98.11
	7	26.36	6.18	332.77		23	18.78	1.73	84.88
	8	26.36	6.11	319.57		24	18.46	1.61	71.65
	9	26.35	6.04	306.37		25	18.13	1.49	58.42
	10	26.33	5.97	293.17		26	17.79	1.37	45.18
	11	-26.31	-5.90	279.97		27	-17.45	-1.25	31.95
	12	26.28	5.83	266.77		28	17.10	1.13	18.72
	13	26.24	5.75	253.57		29	16.75	1.01	5.49
	14	26.19	5.68	240.36		30	16.39	0.89	352.26
	15	26.14	5.60	227.16		31	16.02	0.77	339.02
	16	-26.08	-5.52	213.96	June	1	-15.65	-0.65	325.79
	17	26.01	5.44	200.75		2	15.28	0.53	312.56
	18	25.94	5.36	187.55		3	14.90	0.41	299.32
	19	25.85	5.27	174.34		4	14.52	0.29	286.09
	20	25.76	5.19	161.13		5	14.13	0.17	272.85
	21	-25.67	-5.10	147.92		6	-13.74	-0.05	259.62
	22	25.56	5.01	134.72		7	13.34	+0.07	246.38
	23	25.45	4.92	121.51		8	12.94	0.19	233.15
	24	25.33	4.83	108.30		9	12.54	0.31	219.91
	25	25.20	4.74	95.08		10	12.13	0.43	206.68
	26	-25.07	-4.64	81.87		11	-11.72	+0.55	193.44
	27	24.93	4.55	68.66		12	11.30	0.67	180.20
	28	24.78	4.45	55.44		13	10.88	0.79	166.97
	29	24.62	4.36	42.23		14	10.46	0.91	153.73
	30	24.46	4.26	29.01		15	10.03	1.03	140.49
May	1	-24.29	-4.16	15.80		16	- 9.60	+1.15	127.26
	2	24.11	4.06	2.58		17	9.17	1.27	114.02
	3	23.93	3.95	349.36		18	8.74	1.39	100.78
	4	23.74	3.85	336.15		19	8.30	1.51	87.54
	5	23.54	3.75	322.93		20	7.86	1.63	74.31
	6	-23.33	-3.64	309.71		21	- 7.42	+1.74	61.07
	7	23.12	3.53	296.49		22	6.97	1.86	47.84
	8	22.90	3.43	283.27		23	6.53	1.98	34.60
	9	22.67	3.32	270.04		24	6.08	2.09	21.36
	10	22.44	3.21	256.82		25	5.63	2.21	8.13
	11	-22.19	-3.10	243.60		26	- 5.18	+2.32	354.89
	12	21.94	2.99	230.38		27	4.73	2.43	341.65
	13	21.69	2.88	217.15		28	4.28	2.55	328.41
	14	21.43	2.77	203.93		29	3.83	2.66	315.18
	15	21.16	2.65	190.70		30	3.37	2.77	301.94
	16	-20.88	-2.54	177.47	July	1	- 2.92	+2.88	288.71
	17	-20.60	-2.42	164.25		2	- 2.46	+2.99	275.47

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN

FOR 0^h UNIVERSAL TIME

Date	<i>P</i>	<i>B</i> _o	<i>L</i> _o	Date	<i>P</i>	<i>B</i> _o	<i>L</i> _o
	°	°	°		°	°	°
July 1	- 2.92	+2.88	288.71	Aug. 16	+16.22	+6.69	40.19
2	2.46	2.99	275.47	17	16.56	6.74	26.97
3	2.01	3.10	262.23	18	16.89	6.78	13.76
4	1.55	3.21	249.00	19	17.21	6.82	0.54
5	1.10	3.32	235.76	20	17.53	6.86	347.32
6	- 0.65	+3.42	222.53	21	+17.85	+6.90	334.11
7	- 0.19	3.53	209.29	22	18.17	6.94	320.89
8	+ 0.26	3.64	196.06	23	18.48	6.97	307.68
9	0.72	3.74	182.82	24	18.78	7.01	294.47
10	1.17	3.84	169.59	25	19.07	7.04	281.25
11	+ 1.62	+3.94	156.35	26	+19.36	+7.07	268.04
12	2.07	4.04	143.12	27	19.65	7.09	254.83
13	2.52	4.14	129.89	28	19.93	7.12	241.62
14	2.97	4.24	116.65	29	20.21	7.14	228.41
15	3.41	4.34	103.42	30	20.48	7.16	215.19
16	+ 3.86	+4.43	90.19	31	+20.75	+7.18	201.98
17	4.30	4.53	76.96	Sept. 1	21.01	7.19	188.78
18	4.75	4.62	63.72	2	21.26	7.21	175.57
19	5.19	4.72	50.49	3	21.51	7.22	162.36
20	5.62	4.81	37.26	4	21.75	7.23	149.15
21	+ 6.06	+4.90	24.03	5	+21.99	+7.24	135.94
22	6.49	4.98	10.80	6	22.22	7.24	122.73
23	6.92	5.07	357.57	7	22.45	7.25	109.53
24	7.34	5.16	344.34	8	22.67	7.25	96.32
25	7.77	5.24	331.11	9	22.88	7.25	83.12
26	+ 8.19	+5.32	317.88	10	+23.09	+7.25	69.91
27	8.61	5.41	304.65	11	23.29	7.24	56.71
28	9.02	5.49	291.43	12	23.49	7.24	43.50
29	9.44	5.56	278.20	13	23.68	7.23	30.30
30	9.85	5.64	264.97	14	23.86	7.22	17.10
31	+10.25	+5.72	251.75	15	+24.04	+7.20	3.90
Aug. 1	10.65	5.79	238.52	16	24.21	7.19	350.69
2	11.05	5.86	225.30	17	24.38	7.17	337.49
3	11.45	5.93	212.07	18	24.54	7.15	324.29
4	11.84	6.00	198.84	19	24.69	7.13	311.09
5	+12.23	+6.07	185.62	20	+24.84	+7.11	297.89
6	12.61	6.13	172.40	21	24.98	7.08	284.69
7	12.99	6.20	159.17	22	25.11	7.05	271.49
8	13.37	6.26	145.95	23	25.24	7.02	258.29
9	13.74	6.32	132.73	24	25.36	6.99	245.09
10	+14.11	+6.38	119.51	25	+25.47	+6.96	231.90
11	14.47	6.44	106.29	26	25.58	6.92	218.70
12	14.83	6.49	93.07	27	25.68	6.89	205.50
13	15.18	6.54	79.85	28	25.77	6.85	192.30
14	15.53	6.60	66.63	29	25.86	6.80	179.11
15	+15.88	+6.65	53.41	30	+25.94	+6.76	165.91
16	+16.22	+6.69	40.19	Oct. 1	+26.01	+6.71	152.72

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN
FOR 0^h UNIVERSAL TIME

Date	P	B _o	L _o	Date	P	B _o	L _o
	°	°	°		°	°	°
Oct. 1	+26.01	+6.71	152.72	Nov. 16	+21.31	+2.72	266.04
2	26.08	6.67	139.52	17	21.03	2.60	252.86
3	26.14	6.62	126.32	18	20.74	2.48	239.68
4	26.19	6.56	113.13	19	20.44	2.36	226.50
5	26.24	6.51	99.94	20	20.13	2.24	213.31
6	+26.28	+6.45	86.74	21	+19.82	+2.12	200.13
7	26.31	6.40	73.55	22	19.50	1.99	186.95
8	26.33	6.34	60.35	23	19.17	1.87	173.77
9	26.35	6.27	47.16	24	18.84	1.75	160.59
10	26.36	6.21	33.97	25	18.50	1.62	147.41
11	+26.36	+6.14	20.78	26	+18.15	+1.50	134.23
12	26.35	6.08	7.58	27	17.79	1.37	121.05
13	26.34	6.01	354.39	28	17.43	1.25	107.87
14	26.32	5.94	341.20	29	17.07	1.12	94.69
15	26.29	5.86	328.01	30	16.69	1.00	81.51
16	+26.26	+5.79	314.82	Dec. 1	+16.31	+0.87	68.33
17	26.21	5.71	301.63	2	15.93	0.74	55.16
18	26.16	5.63	288.44	3	15.54	0.61	41.98
19	26.11	5.55	275.25	4	15.14	0.49	28.80
20	26.05	5.47	262.06	5	14.74	0.36	15.62
21	+25.98	+5.39	248.87	6	+14.33	+0.23	2.44
22	25.89	5.30	235.68	7	13.91	+0.10	349.27
23	25.80	5.22	222.49	8	13.49	-0.03	336.09
24	25.70	5.13	209.31	9	13.07	0.15	322.91
25	25.59	5.04	196.12	10	12.64	0.28	309.74
26	+25.48	+4.95	182.93	11	+12.21	-0.41	296.56
27	25.36	4.86	169.74	12	11.77	0.54	283.38
28	25.24	4.76	156.55	13	11.33	0.67	270.21
29	25.10	4.66	143.37	14	10.88	0.79	257.03
30	24.95	4.57	130.18	15	10.43	0.92	243.86
31	+24.80	+4.47	116.99	16	+ 9.97	-1.05	230.68
Nov. 1	24.64	4.37	103.81	17	9.52	1.18	217.51
2	24.47	4.27	90.62	18	9.06	1.30	204.33
3	24.30	4.16	77.43	19	8.59	1.43	191.16
4	24.12	4.06	64.25	20	8.12	1.55	177.99
5	+23.93	+3.95	51.07	21	+ 7.65	-1.68	164.81
6	23.73	3.85	37.88	22	7.18	1.80	151.64
7	23.52	3.74	24.70	23	6.71	1.93	138.47
8	23.31	3.63	11.51	24	6.23	2.05	125.29
9	23.08	3.52	358.33	25	5.75	2.17	112.12
10	+22.85	+3.41	345.14	26	+ 5.27	-2.30	98.95
11	22.61	3.29	331.96	27	4.79	2.42	85.78
12	22.37	3.18	318.77	28	4.31	2.54	72.61
13	22.12	3.07	305.59	29	3.82	2.66	59.43
14	21.86	2.95	292.41	30	3.34	2.78	46.26
15	+21.59	+2.83	279.23	31	+ 2.85	-2.90	33.09
16	+21.31	+2.72	266.04	32	+ 2.37	-3.02	19.92

MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE

FOR 0^h UNIVERSAL TIME

Date	Mean Equator			Orbit		Mean Longitude ☾	Mean Solar Days	Motion in Mean Longitude
	$\dot{z}$	Δ	Ω'	Γ'	Ω			
	°	°	°	°	°	°		°
Jan. -3	24.676	35.548	+2.244	173.9202	217.5934	353.1082	0.1	1.3176
7	24.684	35.044	2.216	175.0342	217.0639	124.8722	0.2	2.6353
17	24.692	34.540	2.188	176.1483	216.5343	256.6361	0.3	3.9529
27	24.700	34.036	2.160	177.2623	216.0048	28.4001	0.4	5.2706
Feb. 6	24.708	33.532	2.132	178.3764	215.4753	160.1641	0.5	6.5882
							0.6	7.9058
16	24.716	33.028	+2.103	179.4904	214.9457	291.9280	0.7	9.2235
26	24.723	32.525	2.075	180.6044	214.4162	63.6920	0.8	10.5411
Mar. 8	24.731	32.021	2.046	181.7185	213.8867	195.4560	0.9	11.8588
18	24.738	31.518	2.017	182.8325	213.3571	327.2199	1.0	13.1764
28	24.746	31.015	1.988	183.9465	212.8276	98.9839	2.0	26.3528
							3.0	39.5292
Apr. 7	24.753	30.512	+1.959	185.0606	212.2980	230.7479	4.0	52.7056
17	24.760	30.009	1.930	186.1746	211.7685	2.5118	5.0	65.8820
27	24.767	29.506	1.900	187.2887	211.2390	134.2758	6.0	79.0584
May 7	24.774	29.004	1.871	188.4027	210.7094	266.0398	7.0	92.2348
17	24.781	28.501	1.841	189.5167	210.1799	37.8037	8.0	105.4112
							9.0	118.5876
27	24.787	27.999	+1.811	190.6308	209.6503	169.5677	10.0	131.7640
June 6	24.794	27.497	1.781	191.7448	209.1208	301.3317	Hours	°
16	24.800	26.995	1.751	192.8588	208.5913	73.0957	1	0.5490
26	24.807	26.493	1.721	193.9729	208.0617	204.8596	2	1.0980
July 6	24.813	25.991	1.691	195.0869	207.5322	336.6236	3	1.6470
							4	2.1961
16	24.819	25.490	+1.661	196.2010	207.0027	108.3876	5	2.7451
26	24.825	24.988	1.630	197.3150	206.4731	240.1515	6	3.2941
Aug. 5	24.831	24.486	1.599	198.4290	205.9436	11.9155	7	3.8431
15	24.837	23.985	1.568	199.5431	205.4140	143.6795	8	4.3921
25	24.843	23.484	1.538	200.6571	204.8845	275.4434	9	4.9411
							10	5.4902
Sept. 4	24.848	22.982	+1.507	201.7711	204.3550	47.2074	11	6.0392
14	24.854	22.481	1.475	202.8852	203.8254	178.9714	12	6.5882
24	24.859	21.980	1.444	203.9992	203.2959	310.7353	13	7.1372
Oct. 4	24.864	21.479	1.413	205.1133	202.7663	82.4993	14	7.6862
14	24.870	20.978	1.381	206.2273	202.2368	214.2633	15	8.2352
							16	8.7843
24	24.875	20.477	+1.350	207.3413	201.7073	346.0272	17	9.3333
Nov. 3	24.879	19.976	1.318	208.4554	201.1777	117.7912	18	9.8823
13	24.884	19.476	1.286	209.5694	200.6482	249.5552	19	10.4313
23	24.889	18.975	1.255	210.6834	200.1187	21.3191	20	10.9803
Dec. 3	24.893	18.475	1.223	211.7975	199.5891	153.0831	21	11.5293
							22	12.0784
13	24.898	17.975	+1.191	212.9115	199.0596	284.8471	23	12.6274
23	24.902	17.474	1.159	214.0256	198.5300	56.6110		
33	24.906	16.974	+1.126	215.1396	198.0005	188.3750		

Daily motion of Γ' +0°111404Daily motion of Ω -0°052954

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON
FOR 0^h UNIVERSAL TIME

Date		The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
Jan.	1	° -4.92	° +0.26	° 0.00	° -0.03	° 35.88	° +1.36	° 340.33	° 341.8	0.76
	2	5.61	1.70	0.00	0.03	48.02	1.37	344.13	344.4	0.84
	3	5.93	3.08	0.00	0.03	60.16	1.38	348.91	347.0	0.91
	4	5.85	4.34	0.00	0.03	72.28	1.39	354.47	348.0	0.96
	5	5.35	5.38	0.00	0.03	84.41	1.40	0.50	340.8	0.99
	6	-4.47	+6.13	0.00	-0.03	96.53	+1.41	6.59	72.9	1.00
	7	3.30	6.51	0.00	0.03	108.66	1.42	12.29	30.0	0.98
	8	1.96	6.48	0.00	0.02	120.78	1.43	17.22	25.9	0.94
	9	-0.55	6.03	0.00	0.02	132.91	1.44	21.04	25.5	0.87
	10	+0.79	5.19	0.00	0.02	145.05	1.45	23.57	25.3	0.78
	11	+1.99	+4.02	0.00	-0.02	157.19	+1.46	24.67	24.6	0.68
	12	2.98	2.62	0.00	0.02	169.34	1.46	24.33	23.2	0.57
	13	3.77	+1.08	0.00	0.02	181.49	1.47	22.57	21.0	0.45
	14	4.34	-0.51	0.00	0.03	193.65	1.48	19.48	18.1	0.34
	15	4.72	2.04	+0.01	0.03	205.82	1.49	15.27	14.7	0.24
	16	+4.94	-3.44	+0.01	-0.03	218.00	+1.50	10.18	11.3	0.16
	17	4.99	4.63	0.01	0.03	230.18	1.51	4.56	8.6	0.09
	18	4.89	5.57	0.01	0.03	242.36	1.52	358.79	8.0	0.04
	19	4.61	6.20	0.01	0.03	254.55	1.53	353.21	16.2	0.01
	20	4.15	6.52	+0.01	0.03	266.74	1.54	348.13	88.3	0.00
	21	+3.49	-6.52	0.00	-0.03	278.93	+1.55	343.75	322.4	0.01
	22	2.63	6.22	0.00	0.03	291.12	1.55	340.21	330.0	0.04
	23	1.56	5.63	0.00	0.03	303.31	1.55	337.60	332.2	0.09
	24	+0.33	4.81	0.00	0.03	315.49	1.55	335.94	333.4	0.15
	25	-1.02	3.79	0.00	0.03	327.67	1.55	335.26	334.6	0.22
	26	-2.42	-2.60	0.00	-0.03	339.84	+1.55	335.57	336.2	0.31
	27	3.80	-1.30	0.00	0.03	352.01	1.55	336.90	338.2	0.40
	28	5.06	+0.07	0.00	0.03	4.17	1.55	339.25	340.8	0.49
	29	6.11	1.46	-0.01	0.03	16.33	1.54	342.61	343.9	0.59
	30	6.83	2.81	0.01	0.03	28.48	1.54	346.95	347.5	0.68
	Feb.	31	-7.16	+4.06	-0.01	-0.02	40.63	+1.53	352.12	351.3	0.77
1		7.02	5.14	0.01	0.02	52.77	1.53	357.91	354.8	0.86
2		6.38	5.95	0.01	0.02	64.90	1.52	4.00	357.2	0.92
3		5.28	6.43	0.01	0.02	77.03	1.52	9.95	355.6	0.97
4		3.79	6.50	0.01	0.02	89.16	1.51	15.32	328.3	1.00
5		-2.05	+6.14	-0.01	-0.02	101.29	+1.50	19.73	46.1	0.99
6		-0.22	5.35	0.01	0.02	113.42	1.49	22.85	31.5	0.96
7		+1.55	4.19	0.01	0.02	125.55	1.48	24.49	27.6	0.90
8		3.10	2.77	-0.01	0.02	137.69	1.47	24.58	24.9	0.82
9		4.37	+1.19	0.00	0.02	149.83	1.46	23.15	22.1	0.72
10		+5.30	-0.44	0.00	-0.02	161.98	+1.45	20.31	18.7	0.61
11		5.89	2.00	0.00	0.02	174.14	1.45	16.28	14.8	0.50
12		6.18	3.42	0.00	0.02	186.31	1.44	11.34	10.6	0.39
13		6.21	4.62	0.00	0.02	198.48	1.43	5.84	6.4	0.29
14		6.00	5.56	0.00	0.02	210.66	1.43	0.13	2.5	0.20
15		+5.60	-6.21	0.00	-0.02	222.85	+1.43	354.55	359.4	0.13
16	+5.01	-6.55	0.00	-0.03	235.04	+1.42	349.39	357.8	0.07	

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON

FOR 0^h UNIVERSAL TIME

Date	The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
	°	°	°	°	°	°	°	°	
Feb. 16	+5.01	-6.55	0.00	-0.03	235.04	+1.42	349.39	357.8	0.07
17	4.26	6.57	0.00	0.03	247.23	1.42	344.85	359.7	0.03
18	3.35	6.29	0.00	0.03	259.43	1.41	341.10	14.9	0.01
19	2.29	5.73	0.00	0.03	271.63	1.41	338.22	290.5	0.00
20	+1.09	4.92	-0.01	0.03	283.83	1.40	336.29	323.5	0.02
21	-0.22	-3.90	-0.01	-0.03	296.02	+1.39	335.33	330.5	0.05
22	1.62	2.72	0.01	0.02	308.22	1.37	335.37	334.0	0.10
23	3.04	1.42	0.01	0.02	320.41	1.36	336.41	337.0	0.16
24	4.43	-0.05	0.01	0.02	332.60	1.35	338.45	340.0	0.24
25	5.70	+1.33	0.01	0.02	344.78	1.33	341.48	343.4	0.32
26	-6.77	+2.67	-0.01	-0.02	356.96	+1.32	345.44	347.2	0.41
27	7.55	3.92	0.01	0.02	9.13	1.30	350.23	351.4	0.51
28	7.95	5.02	0.01	0.02	21.30	1.28	355.67	355.8	0.61
Mar. 1	7.89	5.88	0.01	0.02	33.46	1.26	1.52	0.1	0.71
2	7.33	6.44	0.01	0.02	45.61	1.24	7.42	3.9	0.81
3	-6.26	+6.64	-0.01	-0.02	57.76	+1.22	13.01	6.7	0.89
4	4.74	6.41	0.01	0.02	69.90	1.20	17.86	7.0	0.95
5	2.88	5.74	0.01	0.02	82.05	1.17	21.62	359.1	0.99
6	-0.84	4.65	0.01	0.02	94.18	1.15	23.98	70.3	1.00
7	+1.20	3.24	0.01	0.02	106.33	1.12	24.75	31.2	0.98
8	+3.09	+1.60	-0.01	-0.02	118.47	+1.10	23.88	24.4	0.93
9	4.67	-0.12	0.01	0.02	130.62	1.07	21.42	19.8	0.85
10	5.89	1.79	0.01	0.02	142.78	1.05	17.61	15.3	0.76
11	6.70	3.31	0.01	0.02	154.94	1.03	12.75	10.6	0.66
12	7.12	4.60	0.01	0.02	167.11	1.01	7.23	5.8	0.55
13	+7.16	-5.60	-0.01	-0.02	179.29	+0.99	1.46	1.1	0.44
14	6.89	6.29	0.01	0.02	191.47	0.97	355.79	356.9	0.34
15	6.34	6.67	0.01	0.02	203.66	0.96	350.50	353.2	0.25
16	5.57	6.72	0.01	0.02	215.86	0.94	345.83	350.5	0.17
17	4.60	6.47	0.01	0.02	228.06	0.93	341.90	348.8	0.10
18	+3.49	-5.93	-0.01	-0.02	240.26	+0.91	338.83	348.7	0.05
19	2.26	5.13	0.01	0.02	252.48	0.90	336.66	351.7	0.02
20	+0.94	4.13	0.01	0.02	264.69	0.88	335.46	11.9	0.00
21	-0.44	2.94	0.01	0.02	276.90	0.86	335.24	317.5	0.00
22	1.85	1.63	0.01	0.02	289.11	0.84	336.04	333.6	0.02
23	-3.24	-0.25	-0.01	-0.02	301.32	+0.82	337.84	339.1	0.06
24	4.56	+1.16	0.01	0.02	313.53	0.80	340.62	343.3	0.11
25	5.76	2.53	0.02	0.02	325.74	0.78	344.33	347.5	0.18
26	6.77	3.80	0.02	0.02	337.94	0.76	348.86	351.8	0.26
27	7.52	4.92	0.02	0.02	350.14	0.73	354.05	356.3	0.35
28	-7.93	+5.83	-0.02	-0.02	2.33	+0.71	359.66	0.9	0.45
29	7.96	6.46	0.02	0.02	14.52	0.68	5.41	5.3	0.56
30	7.53	6.76	0.02	0.02	26.69	0.65	10.96	9.3	0.66
31	6.65	6.67	0.02	0.02	38.87	0.62	15.99	12.5	0.76
Apr. 1	5.33	6.16	0.02	0.02	51.03	0.59	20.14	14.7	0.86
2	-3.65	+5.23	-0.02	-0.02	63.20	+0.55	23.11	15.4	0.93
3	-1.72	+3.92	-0.01	-0.02	75.36	+0.52	24.62	13.3	0.98

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON
FOR 0^h UNIVERSAL TIME

Date	The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
	°	°	°	°	°	°	°	°	
Apr. 1	-5.33	+6.16	-0.02	-0.02	51.03	+0.59	20.14	14.7	0.86
2	3.65	5.23	0.02	0.02	63.20	0.55	23.11	15.4	0.93
3	-1.72	3.92	0.01	0.02	75.36	0.52	24.62	13.3	0.98
4	+0.31	2.32	0.01	0.02	87.51	0.48	24.50	344.3	1.00
5	2.29	+0.56	0.01	0.02	99.67	0.45	22.71	23.2	0.99
6	+4.06	-1.22	-0.01	-0.02	111.83	+0.41	19.36	15.9	0.95
7	5.51	2.88	0.01	0.02	123.99	0.38	14.73	10.6	0.88
8	6.57	4.32	0.01	0.02	136.16	0.35	9.21	5.5	0.80
9	7.19	5.46	0.01	0.02	148.34	0.32	3.29	0.5	0.70
10	7.39	6.27	0.01	0.02	160.52	0.29	357.38	355.7	0.60
11	+7.19	-6.72	-0.01	-0.02	172.71	+0.27	351.85	351.6	0.50
12	6.65	6.84	0.01	0.02	184.91	0.25	346.93	348.1	0.40
13	5.81	6.64	0.01	0.02	197.11	0.22	342.77	345.3	0.31
14	4.75	6.14	0.01	0.02	209.32	0.20	339.47	343.4	0.22
15	3.53	5.39	0.01	0.02	221.54	0.18	337.08	342.2	0.15
16	+2.19	-4.41	-0.01	-0.02	233.76	+0.16	335.64	341.8	0.09
17	+0.80	3.24	0.01	0.02	245.99	0.14	335.18	342.3	0.04
18	-0.61	1.94	0.01	0.02	258.21	0.12	335.73	343.9	0.01
19	1.97	-0.55	0.01	0.02	270.44	0.10	337.29	353.5	0.00
20	3.26	+0.88	0.01	0.02	282.67	0.08	339.85	345.6	0.01
21	-4.43	+2.27	-0.02	-0.02	294.90	+0.06	343.37	349.6	0.03
22	5.45	3.58	0.02	0.02	307.13	0.04	347.74	353.6	0.07
23	6.26	4.74	0.02	0.02	319.35	+0.01	352.79	357.9	0.14
24	6.84	5.70	0.02	0.02	331.57	-0.01	358.29	2.3	0.21
25	7.14	6.39	0.02	0.02	343.79	0.04	3.96	6.7	0.30
26	-7.13	+6.76	-0.02	-0.02	356.00	-0.07	9.49	10.7	0.40
27	6.77	6.78	0.02	0.02	8.20	0.10	14.56	14.3	0.51
28	6.06	6.40	0.02	0.02	20.40	0.13	18.89	17.1	0.62
29	5.01	5.63	0.01	0.02	32.59	0.16	22.19	19.1	0.73
30	3.65	4.48	0.01	0.02	44.78	0.20	24.22	20.0	0.83
May 1	-2.04	+3.02	-0.01	-0.02	56.96	-0.24	24.78	20.1	0.91
2	-0.29	+1.33	0.01	0.02	69.13	0.27	23.73	19.5	0.97
3	+1.50	-0.45	0.01	0.02	81.31	0.31	21.07	22.2	1.00
4	3.18	2.19	0.01	0.02	93.48	0.35	16.95	1.6	1.00
5	4.65	3.76	0.01	0.02	105.65	0.38	11.68	2.7	0.97
6	+5.80	-5.05	-0.01	-0.02	117.83	-0.41	5.72	358.9	0.91
7	6.56	6.01	-0.01	0.02	130.02	0.44	359.58	354.5	0.84
8	6.89	6.60	0.00	0.02	142.20	0.47	353.71	350.3	0.75
9	6.80	6.82	-0.01	0.02	154.40	0.50	348.42	346.6	0.66
10	6.33	6.71	0.01	0.02	166.60	0.52	343.91	343.6	0.56
11	+5.52	-6.28	-0.01	-0.02	178.81	-0.54	340.30	341.3	0.46
12	4.44	5.58	0.01	0.02	191.03	0.56	337.62	339.7	0.37
13	3.18	4.65	0.01	0.02	203.24	0.58	335.92	338.9	0.28
14	1.81	3.53	0.01	0.02	215.47	0.60	335.19	338.6	0.20
15	+0.40	2.26	0.01	0.02	227.71	0.62	335.46	338.9	0.13
16	-0.98	-0.89	-0.01	-0.02	239.94	-0.63	336.75	339.5	0.07
17	-2.26	+0.53	-0.01	-0.01	252.18	-0.65	339.06	339.5	0.03

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON

FOR 0^h UNIVERSAL TIME

Date	The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
	°	°	°	°	°	°	°	°	
May 17	-2.26	+0.53	-0.01	-0.01	252.18	-0.65	339.06	339.5	0.03
18	3.40	1.93	0.01	0.01	264.42	0.67	342.36	334.5	0.01
19	4.35	3.27	0.01	0.01	276.67	0.69	346.56	34.7	0.00
20	5.10	4.47	0.01	0.01	288.91	0.71	351.51	6.4	0.02
21	5.61	5.47	0.01	0.01	301.15	0.73	356.99	6.7	0.05
22	-5.88	+6.21	-0.01	-0.01	313.39	-0.75	2.70	9.5	0.10
23	5.91	6.64	0.01	0.01	325.63	0.77	8.30	12.9	0.18
24	5.70	6.72	0.01	0.01	337.86	0.79	13.48	16.1	0.27
25	5.25	6.43	0.01	0.01	350.08	0.81	17.95	18.9	0.37
26	4.59	5.76	0.01	0.01	2.30	0.84	21.46	20.9	0.48
27	-3.71	+4.74	-0.01	-0.01	14.51	-0.86	23.79	22.0	0.59
28	2.63	3.42	0.01	0.01	26.72	0.89	24.78	22.3	0.70
29	1.40	1.86	0.01	0.01	38.92	0.92	24.30	21.7	0.80
30	-0.04	+0.16	-0.01	0.01	51.11	0.95	22.28	20.6	0.89
31	+1.36	-1.55	0.00	0.01	63.30	0.98	18.78	19.8	0.95
June 1	+2.73	-3.15	0.00	-0.01	75.49	-1.01	14.00	24.0	0.99
2	3.98	4.53	0.00	0.01	87.67	1.04	8.29	303.6	1.00
3	4.99	5.61	0.00	0.01	99.86	1.07	2.12	345.6	0.98
4	5.69	6.33	0.00	0.01	112.05	1.09	356.00	346.4	0.94
5	6.03	6.67	0.00	0.01	124.24	1.12	350.34	344.2	0.88
6	+5.97	-6.65	0.00	-0.01	136.44	-1.14	345.41	341.7	0.80
7	5.53	6.31	0.00	0.01	148.64	1.16	341.40	339.6	0.72
8	4.74	5.67	0.00	0.01	160.85	1.17	338.36	338.1	0.62
9	3.68	4.79	0.00	0.01	173.06	1.19	336.32	337.2	0.53
10	2.41	3.72	0.00	0.01	185.28	1.20	335.29	337.0	0.43
11	+1.04	-2.49	0.00	-0.01	197.51	-1.21	335.26	337.4	0.34
12	-0.36	-1.16	0.00	0.01	209.74	1.22	336.25	338.3	0.25
13	1.69	+0.22	0.00	0.01	221.98	1.23	338.25	339.7	0.18
14	2.88	1.61	-0.01	0.01	234.22	1.24	341.25	341.2	0.11
15	3.86	2.95	0.01	0.01	246.47	1.25	345.21	342.2	0.06
16	-4.59	+4.16	-0.01	-0.01	258.72	-1.26	349.99	340.0	0.02
17	5.03	5.20	0.01	0.01	270.97	1.27	355.41	311.4	0.00
18	5.18	5.99	0.01	0.01	283.22	1.27	1.17	31.3	0.01
19	5.06	6.47	0.01	0.01	295.47	1.28	6.93	20.4	0.03
20	4.70	6.60	0.01	0.01	307.72	1.29	12.33	20.1	0.08
21	-4.16	+6.36	-0.01	-0.01	319.97	-1.31	17.05	21.4	0.15
22	3.46	5.75	-0.01	0.01	332.21	1.32	20.81	22.8	0.24
23	2.66	4.79	0.00	0.01	344.44	1.33	23.41	23.6	0.34
24	1.79	3.54	0.00	0.01	356.67	1.35	24.69	23.7	0.45
25	-0.86	2.06	0.00	0.01	8.89	1.36	24.57	22.9	0.57
26	+0.12	+0.45	0.00	-0.01	21.10	-1.38	22.99	21.3	0.68
27	1.12	-1.19	0.00	0.01	33.31	1.40	19.99	19.1	0.78
28	2.12	2.76	0.00	0.01	45.51	1.42	15.70	16.6	0.87
29	3.09	4.15	+0.01	0.01	57.71	1.44	10.38	14.8	0.94
30	3.95	5.27	0.01	0.01	69.90	1.45	4.42	17.2	0.98
July 1	+4.64	-6.06	+0.01	-0.01	82.09	-1.47	358.29	52.8	1.00
2	+5.10	-6.50	+0.01	-0.01	94.28	-1.49	352.41	324.6	0.99

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON
FOR 0^h UNIVERSAL TIME

Date		The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
July	1	+4.64	−6.06	+0.01	−0.01	82.09	−1.47	358.29	52.8	1.00
	2	5.10	6.50	0.01	0.01	94.28	1.49	352.41	324.6	0.99
	3	5.26	6.57	0.01	0.01	106.47	1.50	347.14	334.9	0.96
	4	5.09	6.29	0.01	0.01	118.67	1.51	342.73	336.1	0.91
	5	4.58	5.71	0.01	0.01	130.87	1.52	339.29	335.8	0.85
	6	+3.75	−4.88	+0.01	−0.01	143.07	−1.52	336.88	335.5	0.77
	7	2.67	3.84	0.01	0.01	155.28	1.52	335.50	335.6	0.69
	8	1.39	2.64	+0.01	0.01	167.49	1.53	335.15	336.2	0.60
	9	+0.01	−1.34	0.00	0.01	179.72	1.53	335.82	337.3	0.50
	10	−1.38	+0.02	0.00	0.01	191.94	1.53	337.49	339.0	0.41
	11	−2.68	+1.38	0.00	−0.01	204.17	−1.53	340.16	341.3	0.32
	12	3.81	2.70	0.00	0.01	216.41	1.53	343.78	343.9	0.23
	13	4.68	3.92	0.00	0.01	228.65	1.52	348.29	346.6	0.15
	14	5.23	4.98	0.00	0.01	240.90	1.52	353.51	348.9	0.09
	15	5.42	5.81	0.00	0.01	253.15	1.52	359.22	349.2	0.04
	16	−5.25	+6.35	0.00	−0.01	265.40	−1.52	5.08	339.3	0.01
	17	4.74	6.54	0.00	0.01	277.65	1.51	10.73	70.6	0.00
	18	3.97	6.35	0.00	0.01	289.90	1.51	15.79	32.1	0.02
	19	3.00	5.78	0.00	0.01	302.15	1.51	19.94	27.2	0.06
	20	1.94	4.84	0.00	0.01	314.40	1.51	22.91	26.0	0.13
	21	−0.85	+3.60	0.00	−0.01	326.64	−1.51	24.54	25.2	0.22
	22	+0.20	2.13	+0.01	0.01	338.88	1.51	24.73	23.9	0.32
	23	1.18	+0.54	0.01	0.01	351.11	1.51	23.46	22.0	0.43
	24	2.07	−1.08	0.01	0.01	3.33	1.51	20.78	19.4	0.55
	25	2.88	2.63	0.01	0.01	15.54	1.51	16.83	16.1	0.66
	26	+3.58	−4.00	+0.01	−0.01	27.75	−1.52	11.84	12.5	0.76
	27	4.18	5.13	0.01	0.01	39.95	1.52	6.14	9.0	0.85
	28	4.64	5.95	0.01	0.01	52.15	1.53	0.13	6.4	0.92
	29	4.95	6.43	0.01	0.01	64.34	1.53	354.23	6.7	0.97
	30	5.05	6.55	0.01	0.01	76.53	1.53	348.79	19.3	0.99
Aug.	31	+4.90	−6.34	+0.01	−0.01	88.72	−1.53	344.10	291.2	1.00
	1	4.49	5.80	0.01	0.01	100.91	1.53	340.32	325.4	0.98
	2	3.81	5.00	0.01	0.01	113.10	1.52	337.55	331.1	0.94
	3	2.87	3.97	0.01	0.01	125.30	1.51	335.82	333.2	0.89
	4	1.71	2.79	0.01	0.01	137.49	1.50	335.14	334.7	0.83
	5	+0.39	−1.49	+0.01	−0.01	149.70	−1.50	335.49	336.4	0.75
	6	−1.01	−0.14	0.01	0.01	161.90	1.48	336.84	338.4	0.66
	7	2.41	+1.23	0.01	0.01	174.11	1.47	339.19	340.9	0.57
	8	3.72	2.54	0.01	−0.01	186.33	1.46	342.47	343.8	0.48
	9	4.83	3.77	0.01	0.00	198.56	1.45	346.64	347.2	0.38
	10	−5.66	+4.85	+0.01	0.00	210.78	−1.43	351.56	350.9	0.29
	11	6.13	5.71	0.01	0.00	223.02	1.42	357.06	354.5	0.20
	12	6.19	6.31	0.01	0.00	235.26	1.41	2.86	357.7	0.12
	13	5.82	6.59	0.01	0.00	247.50	1.39	8.63	359.4	0.06
	14	5.05	6.48	0.01	0.00	259.75	1.38	14.00	356.2	0.02
	15	−3.94	+5.98	+0.01	0.00	271.99	−1.36	18.58	311.5	0.00
16	−2.59	+5.08	+0.01	0.00	284.24	−1.35	22.07	39.5	0.01	

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON

FOR 0^h UNIVERSAL TIME

Date	The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
	°	°	°	°	°	°	°	°	
Aug. 16	-2.59	+5.08	+0.01	0.00	284.24	-1.35	22.07	39.5	0.01
17	-1.13	3.85	0.01	0.00	296.49	1.33	24.20	29.2	0.05
18	+0.34	2.35	0.01	0.00	308.73	1.32	24.84	25.6	0.11
19	1.71	+0.71	0.01	0.00	320.96	1.31	23.93	22.8	0.20
20	2.92	-0.97	0.01	0.00	333.19	1.29	21.53	19.7	0.30
21	+3.93	-2.56	+0.02	0.00	345.41	-1.28	17.80	16.0	0.41
22	4.72	3.97	0.02	0.00	357.63	1.27	12.99	11.9	0.52
23	5.29	5.13	0.02	0.00	9.84	1.26	7.44	7.5	0.63
24	5.66	5.98	0.02	0.00	22.04	1.25	1.53	3.3	0.73
25	5.81	6.49	0.02	0.00	34.24	1.24	355.65	359.5	0.82
26	+5.76	-6.65	+0.02	0.00	46.43	-1.22	350.15	356.7	0.89
27	5.49	6.47	0.02	0.00	58.61	1.21	345.30	355.7	0.95
28	5.01	5.98	0.02	0.00	70.80	1.20	341.29	359.4	0.98
29	4.31	5.20	0.02	0.00	82.98	1.18	338.24	34.2	1.00
30	3.39	4.19	0.02	0.00	95.16	1.16	336.21	316.9	0.99
31	+2.29	-3.01	+0.02	0.00	107.34	-1.15	335.22	330.2	0.97
Sept. 1	+1.03	1.70	0.02	0.00	119.52	1.13	335.27	334.6	0.93
2	-0.36	-0.33	0.01	0.00	131.71	1.11	336.33	337.6	0.87
3	1.79	+1.05	0.01	0.00	143.90	1.09	338.39	340.6	0.81
4	3.20	2.39	0.01	0.00	156.09	1.06	341.38	343.8	0.73
5	-4.50	+3.64	+0.01	0.00	168.29	-1.04	345.24	347.4	0.64
6	5.62	4.74	0.01	0.00	180.49	1.02	349.86	351.3	0.54
7	6.46	5.66	0.01	0.00	192.70	1.00	355.08	355.5	0.44
8	6.95	6.32	0.01	0.00	204.91	0.97	0.69	359.7	0.34
9	7.02	6.68	0.01	0.00	217.13	0.95	6.39	3.6	0.25
10	-6.64	+6.69	+0.01	0.00	229.36	-0.93	11.88	7.0	0.16
11	5.80	6.31	0.01	0.00	241.59	0.91	16.78	9.2	0.09
12	4.56	5.52	0.01	0.00	253.82	0.88	20.77	8.9	0.03
13	3.00	4.36	0.01	0.00	266.06	0.86	23.51	356.9	0.00
14	-1.24	2.88	0.01	0.00	278.29	0.83	24.78	40.8	0.00
15	+0.58	+1.19	+0.02	0.00	290.52	-0.81	24.45	25.3	0.03
16	2.31	-0.58	0.02	0.00	302.76	0.78	22.49	20.3	0.09
17	3.86	2.28	0.02	0.00	314.98	0.76	19.05	16.1	0.17
18	5.13	3.81	0.02	0.00	327.20	0.74	14.38	11.6	0.27
19	6.09	5.06	0.02	0.00	339.41	0.71	8.85	6.8	0.37
20	+6.72	-5.99	+0.02	0.00	351.62	-0.69	2.90	2.0	0.48
21	7.02	6.57	0.02	0.00	3.82	0.67	356.94	357.5	0.59
22	7.01	6.78	0.02	0.00	16.01	0.65	351.33	353.5	0.69
23	6.72	6.65	0.02	0.00	28.19	0.62	346.34	350.2	0.78
24	6.17	6.19	0.02	0.00	40.37	0.60	342.16	347.8	0.86
25	+5.39	-5.45	+0.02	0.00	52.55	-0.57	338.90	346.5	0.92
26	4.42	4.47	0.02	0.00	64.72	0.55	336.62	346.7	0.97
27	3.28	3.30	0.02	0.00	76.89	0.52	335.36	351.0	0.99
28	2.02	2.00	0.02	0.00	89.05	0.50	335.14	280.6	1.00
29	+0.65	-0.62	0.02	0.00	101.22	0.47	335.94	335.3	0.99
30	-0.76	+0.79	+0.02	0.00	113.39	-0.44	337.74	340.8	0.96
Oct. 1	-2.19	+2.16	+0.01	0.00	125.56	-0.41	340.49	344.5	0.92

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON
FOR 0^h UNIVERSAL TIME

Date		The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
Oct.	1	° -2.19	° +2.16	° +0.01	° 0.00	° 125.56	° -0.41	° 340.49	° 344.5	0.92
	2	3.56	3.45	0.01	0.00	137.73	0.39	344.12	348.2	0.86
	3	4.83	4.59	0.01	0.00	149.90	0.36	348.51	352.1	0.78
	4	5.92	5.55	0.01	0.00	162.09	0.33	353.51	356.3	0.70
	5	6.77	6.27	0.01	0.00	174.27	0.31	358.92	0.6	0.61
	6	-7.30	+6.71	+0.01	0.00	186.46	-0.28	4.49	4.9	0.51
	7	7.46	6.83	0.01	0.00	198.65	0.25	9.94	8.8	0.40
	8	7.19	6.58	0.01	0.00	210.85	0.23	14.96	12.3	0.30
	9	6.49	5.96	0.01	0.00	223.06	0.20	19.24	15.1	0.20
	10	5.35	4.94	0.01	0.00	235.27	0.17	22.49	16.9	0.12
	11	-3.83	+3.58	+0.01	0.00	247.49	-0.14	24.42	17.6	0.05
	12	2.03	1.95	0.01	0.00	259.71	0.11	24.82	16.5	0.01
	13	-0.06	+0.16	0.02	0.00	271.93	0.09	23.56	25.7	0.00
	14	+1.92	-1.65	0.02	0.00	284.15	0.06	20.66	14.8	0.02
	15	3.76	3.32	0.02	0.00	296.36	-0.03	16.30	10.6	0.07
	16	+5.35	-4.73	+0.02	0.00	308.57	0.00	10.86	6.0	0.14
	17	6.57	5.81	0.02	0.00	320.78	+0.03	4.79	1.1	0.23
	18	7.39	6.51	0.02	0.00	332.98	0.06	358.61	356.4	0.33
	19	7.79	6.82	0.02	0.00	345.17	0.09	352.73	352.0	0.44
	20	7.77	6.76	0.02	0.00	357.36	0.11	347.48	348.2	0.54
	21	+7.38	-6.36	+0.02	0.00	9.54	+0.14	343.06	345.1	0.64
	22	6.67	5.67	0.02	0.00	21.71	0.17	339.56	342.8	0.74
	23	5.71	4.73	0.02	0.00	33.88	0.20	337.06	341.2	0.82
	24	4.55	3.59	0.02	0.00	46.04	0.23	335.56	340.3	0.88
	25	3.25	2.32	0.02	0.00	58.20	0.26	335.09	339.9	0.94
	26	+1.87	-0.94	+0.02	0.00	70.35	+0.29	335.63	339.5	0.98
	27	+0.45	+0.46	0.01	+0.01	82.50	0.31	337.18	336.0	1.00
	28	-0.95	1.85	0.01	0.01	94.65	0.34	339.71	1.8	1.00
	29	2.31	3.16	0.01	0.01	106.80	0.37	343.14	353.8	0.98
	30	3.57	4.35	0.01	0.01	118.95	0.40	347.38	355.5	0.95
	Nov.	31	-4.71	+5.35	+0.01	+0.01	131.11	+0.42	352.25	358.8	0.90
1		5.67	6.12	0.01	0.01	143.27	0.45	357.56	2.5	0.83
2		6.43	6.62	0.01	0.01	155.42	0.47	3.06	6.5	0.76
3		6.93	6.81	0.01	0.01	167.59	0.50	8.47	10.3	0.66
4		7.14	6.67	0.01	0.01	179.76	0.52	13.51	13.9	0.56
5		-7.01	+6.17	+0.01	+0.01	191.93	+0.54	17.92	16.9	0.46
6		6.52	5.31	0.01	0.01	204.11	0.57	21.44	19.2	0.35
7		5.64	4.12	0.01	0.01	216.30	0.59	23.83	20.7	0.25
8		4.38	2.63	0.01	0.01	228.49	0.62	24.86	21.5	0.15
9		2.80	+0.94	0.01	0.01	240.69	0.64	24.35	21.6	0.08
10		-0.98	-0.85	+0.01	+0.01	252.89	+0.67	22.21	22.6	0.02
11		+0.97	2.58	0.01	0.01	265.10	0.69	18.49	44.1	0.00
12		2.90	4.13	0.01	0.01	277.30	0.72	13.42	355.2	0.01
13		4.65	5.37	0.02	0.01	289.51	0.75	7.42	357.4	0.05
14		6.09	6.23	0.02	0.01	301.71	0.77	1.03	354.3	0.11
15		+7.11	-6.68	+0.02	+0.01	313.90	+0.80	354.78	350.4	0.19
16	+7.67	-6.73	+0.02	+0.01	326.09	+0.83	349.11	346.7	0.28	

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON

FOR 0^h UNIVERSAL TIME

Date	The Earth's Selenographic—		Physical Libration		The Sun's Selenographic—		Position Angle of—		Fraction Illuminated
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis	Terminator	
	°	°	°	°	°	°	°	°	
Nov. 16	+7.67	-6.73	+0.02	+0.01	326.09	+0.83	349.11	346.7	0.28
17	7.75	6.41	0.02	0.01	338.27	0.85	344.27	343.6	0.38
18	7.39	5.78	0.02	0.01	350.44	0.88	340.42	341.1	0.48
19	6.65	4.89	0.01	0.01	2.61	0.90	337.61	339.3	0.58
20	5.62	3.79	0.01	0.01	14.77	0.93	335.84	338.2	0.67
21	+4.37	-2.55	+0.01	+0.01	26.93	+0.95	335.10	337.8	0.76
22	3.00	-1.21	0.01	0.01	39.08	0.98	335.39	337.8	0.83
23	1.57	+0.17	0.01	0.01	51.23	1.00	336.68	338.1	0.90
24	+0.15	1.55	0.01	0.01	63.37	1.03	338.96	338.2	0.95
25	-1.20	2.86	0.01	0.01	75.51	1.05	342.17	335.9	0.98
26	-2.43	+4.06	+0.01	+0.01	87.65	+1.07	346.24	314.3	1.00
27	3.51	5.09	0.00	0.01	99.78	1.09	351.01	23.3	1.00
28	4.41	5.89	0.00	0.01	111.91	1.11	356.28	10.9	0.98
29	5.14	6.43	0.00	0.01	124.05	1.13	1.80	11.0	0.94
30	5.66	6.67	0.00	0.01	136.19	1.14	7.28	13.3	0.88
Dec. 1	-5.99	+6.58	0.00	+0.01	148.33	+1.16	12.42	16.0	0.80
2	6.10	6.15	0.00	0.01	160.48	1.17	16.95	18.6	0.71
3	5.97	5.39	0.00	0.01	172.63	1.18	20.64	20.7	0.61
4	5.59	4.31	0.00	0.01	184.79	1.20	23.28	22.2	0.51
5	4.94	2.96	0.00	0.01	196.96	1.21	24.69	22.8	0.40
6	-4.00	+1.40	0.00	+0.01	209.13	+1.22	24.72	22.7	0.29
7	2.78	-0.27	+0.01	0.01	221.31	1.24	23.26	21.9	0.19
8	-1.31	1.95	0.01	0.01	233.50	1.25	20.26	20.7	0.10
9	+0.33	3.52	0.01	0.01	245.69	1.27	15.83	20.6	0.04
10	2.04	4.85	0.01	0.01	257.88	1.29	10.24	29.4	0.01
11	+3.67	-5.84	+0.01	+0.01	270.07	+1.30	3.94	313.5	0.00
12	5.08	6.43	0.01	0.01	282.26	1.32	357.48	341.7	0.02
13	6.15	6.60	0.01	0.01	294.45	1.34	351.37	342.9	0.07
14	6.78	6.39	0.01	0.01	306.64	1.35	346.03	341.3	0.14
15	6.95	5.82	0.01	0.01	318.82	1.37	341.68	339.4	0.22
16	+6.66	-4.98	+0.01	+0.01	331.00	+1.39	338.41	337.9	0.31
17	5.97	3.92	0.01	0.01	343.16	1.40	336.27	336.9	0.40
18	4.95	2.70	+0.01	0.01	355.33	1.42	335.20	336.6	0.50
19	3.70	1.38	0.00	0.01	7.49	1.44	335.19	336.9	0.60
20	2.31	-0.02	0.00	0.01	19.64	1.45	336.20	337.8	0.69
21	+0.88	+1.34	0.00	+0.01	31.78	+1.46	338.20	339.1	0.77
22	-0.51	2.64	0.00	0.01	43.92	1.48	341.14	340.7	0.84
23	1.78	3.83	0.00	0.01	56.06	1.49	344.97	342.2	0.91
24	2.87	4.87	0.00	0.01	68.19	1.50	349.57	342.6	0.95
25	3.74	5.70	0.00	0.01	80.32	1.51	354.76	337.9	0.99
26	-4.37	+6.27	-0.01	+0.01	92.45	+1.51	0.30	292.3	1.00
27	4.78	6.54	0.01	0.01	104.58	1.51	5.90	32.7	0.99
28	4.96	6.49	0.01	0.01	116.70	1.52	11.24	23.2	0.96
29	4.95	6.09	0.01	0.01	128.84	1.52	16.01	22.3	0.91
30	4.77	5.35	0.01	0.01	140.97	1.51	19.94	23.0	0.84
31	-4.44	+4.31	-0.01	+0.01	153.11	+1.51	22.83	23.7	0.76
32	-3.96	+3.01	-0.01	+0.01	165.25	+1.51	24.50	23.9	0.66

ILLUMINATED DISK OF MERCURY, 1958
FOR 0^h UNIVERSAL TIME

Date		<i>k</i>	<i>i</i>	<i>θ</i>	<i>L</i>	Stellar Mag.	Date		<i>k</i>	<i>i</i>	<i>θ</i>	<i>L</i>	Stellar Mag.
			°	°						°	°		
Jan.	1	0.144	135	195	28.4	+1.2	July	5	0.794	54	7	43.1	-0.4
	6	0.340	109	190	45.4	0.5		10	0.713	65	12	38.0	-0.1
	11	0.508	89	186	45.9	+0.2		15	0.636	74	15	34.9	+0.2
	16	0.632	75	183	40.7	0.0		20	0.563	83	19	33.0	0.4
	21	0.721	64	179	35.3	0.0		25	0.488	91	22	32.0	0.6
	26	0.786	55	174	31.2	-0.1		30	0.409	100	24	31.1	+0.8
	31	0.836	48	170	28.5	0.1	Aug.	4	0.322	111	27	29.5	1.0
Feb.	5	0.876	41	165	27.1	0.2		9	0.226	123	31	25.5	1.3
	10	0.909	35	160	26.7	0.3		14	0.126	138	37	17.7	1.7
	15	0.938	29	155	27.6	0.4		19	0.043	156	50	7.2	2.4
	20	0.963	22	149	29.7	-0.6		24	0.010	169	119	1.8	+2.9
	25	0.984	15	139	33.4	0.9		29	0.059	152	181	10.9	2.1
Mar.	2	0.997	6	109	39.3	1.2	Sept.	3	0.197	127	194	32.9	1.0
	7	0.994	9	4	47.9	1.4		8	0.400	102	200	55.9	+0.1
	12	0.958	24	342	58.7	1.4		13	0.621	76	204	68.3	-0.5
	17	0.867	43	336	68.5	-1.2		18	0.803	53	209	66.5	-0.9
	22	0.710	65	334	71.0	0.8		23	0.919	33	213	56.6	1.1
	27	0.511	89	332	62.0	-0.2		28	0.976	18	219	45.9	1.2
Apr.	1	0.315	112	330	44.9	+0.5	Oct.	3	0.997	6	239	37.5	1.2
	6	0.155	134	328	25.2	1.3		8	0.998	5	355	31.8	1.0
	11	0.047	155	321	8.5	+2.2		13	0.989	12	17	28.2	-0.8
	16	0.003	174	281	0.5	3.2		18	0.973	19	21	26.1	0.6
	21	0.020	164	165	3.5	2.7		23	0.953	25	22	25.3	0.4
	26	0.083	147	156	12.6	2.0		28	0.927	31	21	25.6	0.3
May	1	0.168	132	153	21.3	1.5	Nov.	2	0.895	38	20	27.1	0.3
	6	0.257	119	152	27.2	+1.2		7	0.854	45	18	29.8	-0.2
	11	0.345	108	152	30.9	0.9		12	0.797	54	15	34.0	0.2
	16	0.431	98	153	33.5	0.6		17	0.717	64	13	40.0	0.2
	21	0.517	88	154	36.3	0.4		22	0.602	78	10	47.1	-0.1
	26	0.607	78	156	40.0	+0.1		27	0.439	97	8	51.1	+0.2
	31	0.705	66	158	45.5	-0.3	Dec.	2	0.230	123	5	40.6	+0.8
June	5	0.810	52	162	52.9	0.7		7	0.043	156	359	10.4	2.0
	10	0.911	35	168	61.2	1.2		12	0.019	164	212	4.7	2.4
	15	0.982	15	181	66.9	1.7		17	0.181	130	199	34.8	1.0
	20	0.997	7	323	65.9	1.8		22	0.393	102	196	50.6	+0.3
	25	0.953	25	352	58.9	-1.4		27	0.567	82	193	48.8	0.0
	30	0.877	41	1	50.3	-0.9		32	0.691	68	189	41.9	-0.2

NOTATION

k=the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.
i=the angle between the Sun and Earth, as seen from the planet. °
θ=the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.
L=the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

FOR 0^h UNIVERSAL TIME

Date	<i>k</i>	<i>i</i>	θ	<i>L</i>	Stellar Mag.	Date	<i>k</i>	<i>i</i>	θ	<i>L</i>	Stellar Mag.
		°	°					°	°		
Jan. 1	0.192	128.0	341.8	202.6	-4.3	July 5	0.822	49.8	169.1	63.5	-3.4
6	0.146	135.1	339.6	180.5	4.3	10	0.836	47.8	171.6	61.8	3.4
11	0.100	143.1	336.5	143.9	4.1	15	0.849	45.8	174.3	60.2	3.3
16	0.059	151.9	331.2	96.1	3.9	20	0.861	43.7	177.2	58.8	3.3
21	0.027	161.1	320.1	48.3	3.6	25	0.873	41.7	180.1	57.5	3.3
26	0.009	168.9	289.5	17.7	-3.3	30	0.885	39.7	183.1	56.4	-3.3
31	0.010	168.6	230.3	18.3	3.3	Aug. 4	0.896	37.7	186.0	55.3	3.3
Feb. 5	0.028	160.8	200.9	49.1	3.6	9	0.906	35.7	189.0	54.3	3.3
10	0.060	151.7	189.7	95.2	3.9	14	0.916	33.7	191.8	53.4	3.3
15	0.101	143.0	184.0	139.9	4.1	19	0.925	31.7	194.6	52.6	3.3
20	0.146	135.1	180.2	173.3	-4.2	24	0.934	29.7	197.2	51.8	-3.3
25	0.191	128.1	177.2	193.1	4.3	29	0.942	27.8	199.6	51.1	3.3
Mar. 2	0.236	121.9	174.7	201.4	4.3	Sept. 3	0.950	25.8	201.9	50.5	3.3
7	0.278	116.4	172.3	201.4	4.3	8	0.957	23.8	204.0	49.9	3.3
12	0.317	111.5	170.1	196.1	4.3	13	0.964	21.9	205.9	49.3	3.3
17	0.354	107.0	168.0	187.8	-4.2	18	0.970	20.0	207.6	48.8	-3.4
22	0.388	102.9	166.0	178.1	4.2	23	0.975	18.1	209.1	48.4	3.4
27	0.420	99.2	164.2	167.8	4.1	28	0.980	16.2	210.4	48.0	3.4
Apr. 1	0.450	95.7	162.4	157.8	4.1	Oct. 3	0.984	14.3	211.5	47.6	3.4
6	0.479	92.4	160.8	148.0	4.0	8	0.988	12.5	212.5	47.3	3.4
11	0.505	89.4	159.4	138.9	-4.0	13	0.991	10.6	213.4	47.0	-3.4
16	0.531	86.5	158.1	130.4	3.9	18	0.994	8.8	214.3	46.7	3.4
21	0.555	83.7	157.1	122.7	3.9	23	0.996	7.0	215.4	46.5	3.5
26	0.578	81.1	156.2	115.6	3.8	28	0.998	5.3	217.3	46.3	3.5
May 1	0.600	78.5	155.6	109.1	3.8	Nov. 2	0.999	3.6	221.3	46.1	3.5
6	0.621	76.0	155.2	103.3	-3.7	7	1.000	1.9	233.5	46.0	-3.5
11	0.641	73.6	155.1	97.9	3.7	12	1.000	0.9	296.3	45.9	3.5
16	0.660	71.3	155.1	93.1	3.6	17	1.000	2.0	354.9	45.9	3.5
21	0.679	69.0	155.5	88.7	3.6	22	0.999	3.6	5.5	45.9	3.5
26	0.697	66.8	156.0	84.7	3.6	27	0.998	5.2	8.0	45.9	3.5
31	0.715	64.6	156.8	81.1	-3.5	Dec. 2	0.996	6.8	8.1	46.0	-3.4
June 5	0.732	62.4	157.9	77.8	3.5	7	0.995	8.5	7.0	46.1	3.4
10	0.748	60.3	159.2	74.8	3.5	12	0.992	10.1	5.3	46.3	3.4
15	0.764	58.1	160.7	72.1	3.5	17	0.989	11.8	3.2	46.5	3.4
20	0.779	56.0	162.5	69.6	3.4	22	0.986	13.4	0.9	46.8	3.4
25	0.794	54.0	164.4	67.4	-3.4	27	0.983	15.0	358.5	47.1	-3.4
30	0.809	51.9	166.7	65.4	-3.4	32	0.979	16.7	356.1	47.5	-3.4

NOTATION

k=the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

i=the angle between the Sun and Earth, as seen from the planet.

θ =the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

L=the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS
FOR 0^h UNIVERSAL TIME

Date		Light-Time	Stellar Magnitude	<i>P</i>	<i>A</i> _⊕ +180°	<i>D</i> _⊕	<i>A</i> _⊙ - <i>A</i> _⊕	<i>D</i> _⊙	☉♂
		m		°	°	°	°	°	°
Jan.	1	18.92	+1.8	34.06	339.40	+ 8.23	-19.50	+15.99	137.33
	3	18.81	1.7	33.70	340.69	7.68	19.81	15.68	138.33
	5	18.71	1.7	33.32	341.98	7.12	20.11	15.36	139.33
	7	18.60	1.7	32.92	343.26	6.56	20.41	15.04	140.33
	9	18.50	1.7	32.50	344.55	6.00	20.72	14.71	141.34
	11	18.39	+1.7	32.06	345.84	+ 5.43	-21.02	+14.38	142.35
	13	18.29	1.7	31.60	347.13	4.86	21.32	14.04	143.36
	15	18.18	1.7	31.12	348.41	4.28	21.62	13.70	144.38
	17	18.07	1.7	30.62	349.70	3.71	21.92	13.35	145.40
	19	17.96	1.7	30.10	350.99	3.13	22.22	12.99	146.42
	21	17.85	+1.7	29.56	352.28	+ 2.55	-22.52	+12.63	147.45
	23	17.74	1.6	29.00	353.57	1.96	22.83	12.27	148.48
	25	17.62	1.6	28.43	354.86	1.38	23.13	11.90	149.52
	27	17.51	1.6	27.84	356.15	0.79	23.43	11.53	150.55
	29	17.40	1.6	27.23	357.44	+ 0.20	23.73	11.15	151.59
	31	17.28	+1.6	26.61	358.73	- 0.38	-24.04	+10.77	152.64
Feb.	2	17.17	1.6	25.97	0.03	0.97	24.34	10.38	153.69
	4	17.05	1.6	25.31	1.33	1.56	24.65	9.99	154.74
	6	16.94	1.6	24.64	2.63	2.15	24.96	9.59	155.80
	8	16.82	1.5	23.96	3.93	2.74	25.27	9.19	156.86
	10	16.71	+1.5	23.26	5.24	- 3.32	-25.58	+ 8.79	157.92
	12	16.59	1.5	22.54	6.56	3.91	25.90	8.38	158.99
	14	16.47	1.5	21.81	7.87	4.49	26.21	7.97	160.06
	16	16.36	1.5	21.08	9.19	5.07	26.53	7.55	161.13
	18	16.24	1.5	20.33	10.51	5.65	26.86	7.13	162.21
	20	16.12	+1.5	19.56	11.84	- 6.23	-27.18	+ 6.71	163.29
	22	16.00	1.4	18.78	13.18	6.80	27.51	6.29	164.38
	24	15.89	1.4	18.00	14.52	7.37	27.84	5.86	165.47
	26	15.77	1.4	17.21	15.86	7.93	28.18	5.42	166.56
	28	15.65	1.4	16.40	17.21	8.49	28.52	4.99	167.65
Mar.	2	15.53	+1.4	15.59	18.56	- 9.05	-28.86	+ 4.55	168.75
	4	15.41	1.4	14.76	19.92	9.60	29.20	4.11	169.86
	6	15.30	1.4	13.93	21.29	10.15	29.55	3.66	170.97
	8	15.18	1.3	13.09	22.66	10.69	29.90	3.21	172.08
	10	15.06	1.3	12.25	24.04	11.22	30.26	2.76	173.20
	12	14.94	+1.3	11.40	25.43	-11.75	-30.62	+ 2.31	174.32
	14	14.82	1.3	10.54	26.82	12.27	30.99	1.85	175.44
	16	14.71	1.3	9.67	28.22	12.79	31.36	1.40	176.57
	18	14.59	1.3	8.80	29.63	13.29	31.73	0.94	177.70
	20	14.47	1.2	7.92	31.05	13.79	32.11	0.48	178.83
	22	14.36	+1.2	7.04	32.47	-14.28	-32.49	+ 0.01	179.97
	24	14.24	1.2	6.16	33.90	14.76	32.88	- 0.45	181.11
	26	14.12	1.2	5.27	35.34	15.23	33.27	0.92	182.26
	28	14.01	1.2	4.38	36.78	15.70	33.66	1.39	183.41
	30	13.89	1.2	3.49	38.23	16.15	34.06	1.85	184.56
Apr.	1	13.78	+1.1	2.59	39.69	-16.59	-34.46	- 2.32	185.72
	3	13.66	+1.1	1.69	41.16	-17.02	-34.87	- 2.79	186.88

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS

FOR 0^h UNIVERSAL TIME

								Universal Time of Transit of Zero Meridian	
Date	<i>k</i>	Diameter	<i>i</i>	<i>q</i>	<i>Q</i>	Central Meridian		Of Date	Of Interme- diate Date
						Of Date	Of Interme- diate Date		
		"	°	"	°	°	°	h m	h m
Jan. 1	0.968	4.11	20.58	0.13	280.04	8.39	358.65	...	0 05.6
3	0.967	4.13	20.97	0.14	279.47	348.91	339.17	0 45.6	1 25.7
5	0.966	4.16	21.36	0.14	278.89	329.43	319.69	2 05.7	2 45.7
7	0.964	4.18	21.76	0.15	278.30	309.95	300.21	3 25.8	4 05.8
9	0.963	4.20	22.15	0.15	277.71	290.47	280.73	4 45.8	5 25.9
11	0.962	4.23	22.54	0.16	277.11	270.99	261.25	6 05.9	6 46.0
13	0.961	4.25	22.93	0.17	276.51	251.51	241.78	7 26.0	8 06.0
15	0.959	4.28	23.32	0.17	275.90	232.04	222.30	8 46.1	9 26.1
17	0.958	4.30	23.70	0.18	275.29	212.56	202.82	10 06.2	10 46.2
19	0.956	4.33	24.09	0.19	274.67	193.08	183.35	11 26.2	12 06.3
21	0.955	4.36	24.47	0.20	274.04	173.61	163.87	12 46.3	13 26.3
23	0.954	4.39	24.86	0.20	273.42	154.13	144.39	14 06.3	14 46.4
25	0.952	4.41	25.24	0.21	272.79	134.65	124.91	15 26.5	16 06.5
27	0.951	4.44	25.62	0.22	272.15	115.17	105.43	16 46.5	17 26.6
29	0.949	4.47	26.00	0.23	271.52	95.69	85.95	18 06.6	18 46.7
31	0.948	4.50	26.37	0.23	270.88	76.21	66.47	19 26.7	20 06.8
Feb. 2	0.946	4.53	26.75	0.24	270.24	56.72	46.98	20 46.8	21 26.9
4	0.945	4.56	27.12	0.25	269.60	37.24	27.49	22 07.0	22 47.0
6	0.943	4.59	27.49	0.26	268.96	17.75	8.00	23 27.1	...
8	0.942	4.62	27.86	0.27	268.32	358.26	348.51	0 07.2	0 47.3
10	0.940	4.65	28.23	0.28	267.68	338.76	329.01	1 27.3	2 07.4
12	0.939	4.69	28.60	0.29	267.05	319.26	309.51	2 47.5	3 27.6
14	0.937	4.72	28.97	0.29	266.41	299.76	290.00	4 07.7	4 47.8
16	0.936	4.75	29.33	0.30	265.78	280.25	270.49	5 27.9	6 08.0
18	0.934	4.79	29.69	0.31	265.15	260.74	250.98	6 48.1	7 28.2
20	0.933	4.82	30.05	0.32	264.52	241.22	231.46	8 08.4	8 48.5
22	0.931	4.86	30.41	0.33	263.90	221.70	211.94	9 28.6	10 08.8
24	0.930	4.90	30.77	0.34	263.28	202.18	192.41	10 48.9	11 29.0
26	0.928	4.93	31.12	0.35	262.66	182.64	172.88	12 09.2	12 49.4
28	0.926	4.97	31.47	0.37	262.05	163.11	153.34	13 29.5	14 09.7
Mar. 2	0.925	5.01	31.82	0.38	261.45	143.57	133.79	14 49.9	15 30.1
4	0.923	5.05	32.17	0.39	260.85	124.02	114.24	16 10.3	16 50.5
6	0.922	5.08	32.51	0.40	260.26	104.47	94.69	17 30.7	18 10.9
8	0.920	5.12	32.85	0.41	259.68	84.90	75.12	18 51.1	19 31.3
10	0.919	5.16	33.19	0.42	259.11	65.34	55.55	20 11.6	20 51.8
12	0.917	5.20	33.53	0.43	258.54	45.77	35.98	21 32.1	22 12.3
14	0.915	5.25	33.87	0.44	257.98	26.19	16.39	22 52.6	23 32.9
16	0.914	5.29	34.20	0.46	257.43	6.60	356.80	...	0 13.2
18	0.912	5.33	34.53	0.47	256.89	347.00	337.20	0 53.4	1 33.7
20	0.910	5.37	34.86	0.48	256.37	327.40	317.60	2 14.1	2 54.4
22	0.909	5.42	35.18	0.50	255.85	307.79	297.98	3 34.7	4 15.0
24	0.907	5.46	35.51	0.51	255.34	288.17	278.36	4 55.4	5 35.7
26	0.905	5.51	35.83	0.52	254.85	268.55	258.73	6 16.1	6 56.4
28	0.904	5.55	36.14	0.53	254.36	248.92	239.10	7 36.8	8 17.2
30	0.902	5.60	36.46	0.55	253.89	229.28	219.45	8 57.6	9 38.0
Apr. 1	0.901	5.65	36.77	0.56	253.43	209.63	199.80	10 18.4	10 58.8
3	0.899	5.69	37.08	0.58	252.98	189.97	180.14	11 39.2	12 19.6

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS
FOR 0^h UNIVERSAL TIME

Date		Light-Time	Stellar Magnitude	<i>P</i>	<i>A</i> _⊕ +180°	<i>D</i> _⊕	<i>A</i> _☉ - <i>A</i> _⊕	<i>D</i> _☉	☉♂
		m		°	°	°	°	°	°
Apr.	1	13.78	+1.1	2.59	39.69	-16.59	-34.46	- 2.32	185.72
	3	13.66	1.1	1.69	41.16	17.02	34.87	2.79	186.88
	5	13.55	1.1	0.79	42.64	17.44	35.28	3.26	188.05
	7	13.43	1.1	359.89	44.12	17.85	35.69	3.73	189.21
	9	13.32	1.1	358.99	45.61	18.25	36.10	4.20	190.38
	11	13.21	+1.1	358.09	47.11	-18.64	-36.52	- 4.67	191.56
	13	13.09	1.0	357.19	48.62	19.01	36.94	5.14	192.74
	15	12.98	1.0	356.29	50.13	19.37	37.36	5.61	193.92
	17	12.87	1.0	355.39	51.65	19.72	37.79	6.08	195.11
	19	12.76	1.0	354.49	53.18	20.05	38.22	6.55	196.30
	21	12.65	+1.0	353.60	54.71	-20.37	-38.65	- 7.02	197.49
	23	12.54	1.0	352.71	56.25	20.67	39.08	7.48	198.69
	25	12.43	0.9	351.82	57.79	20.96	39.51	7.95	199.89
	27	12.32	0.9	350.94	59.34	21.23	39.93	8.41	201.09
	29	12.21	0.9	350.06	60.90	21.49	40.36	8.87	202.29
May	1	12.10	+0.9	349.18	62.46	-21.74	-40.79	- 9.33	203.50
	3	11.99	0.9	348.31	64.03	21.96	41.22	9.79	204.71
	5	11.88	0.8	347.45	65.60	22.18	41.64	10.24	205.93
	7	11.78	0.8	346.60	67.17	22.38	42.06	10.69	207.15
	9	11.67	0.8	345.75	68.75	22.56	42.48	11.14	208.37
	11	11.57	+0.8	344.91	70.33	-22.72	-42.90	-11.58	209.59
	13	11.46	0.8	344.08	71.91	22.87	43.31	12.02	210.82
	15	11.36	0.8	343.26	73.49	23.00	43.72	12.46	212.05
	17	11.25	0.7	342.45	75.08	23.11	44.12	12.89	213.28
	19	11.15	0.7	341.65	76.66	23.21	44.52	13.32	214.51
	21	11.05	+0.7	340.85	78.24	-23.29	-44.91	-13.74	215.75
	23	10.94	0.7	340.07	79.83	23.35	45.29	14.16	216.99
	25	10.84	0.7	339.31	81.41	23.40	45.66	14.57	218.23
	27	10.74	0.6	338.56	82.99	23.43	46.03	14.98	219.47
	29	10.64	0.6	337.82	84.57	23.44	46.38	15.38	220.72
	31	10.54	+0.6	337.10	86.14	-23.44	-46.73	-15.77	221.97
June	2	10.44	0.6	336.39	87.71	23.42	47.06	16.16	223.22
	4	10.34	0.6	335.70	89.28	23.38	47.38	16.54	224.47
	6	10.24	0.5	335.02	90.84	23.33	47.70	16.92	225.72
	8	10.14	0.5	334.36	92.39	23.26	48.00	17.29	226.98
	10	10.04	+0.5	333.71	93.94	-23.17	-48.29	-17.65	228.24
	12	9.95	0.5	333.09	95.48	23.07	48.56	18.00	229.50
	14	9.85	0.5	332.48	97.02	22.96	48.82	18.35	230.76
	16	9.75	0.4	331.89	98.55	22.83	49.06	18.69	232.02
	18	9.65	0.4	331.32	100.06	22.68	49.29	19.02	233.28
	20	9.56	+0.4	330.77	101.57	-22.52	-49.50	-19.34	234.54
	22	9.46	0.4	330.24	103.07	22.35	49.70	19.65	235.81
	24	9.37	0.4	329.73	104.56	22.16	49.88	19.95	237.08
	26	9.27	0.3	329.23	106.03	21.96	50.04	20.24	238.34
	28	9.18	0.3	328.76	107.49	21.75	50.19	20.53	239.61
July	30	9.08	+0.3	328.31	108.94	-21.52	-50.32	-20.80	240.88
	2	8.99	+0.3	327.88	110.39	-21.29	-50.43	-21.06	242.15

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS

FOR 0^h UNIVERSAL TIME

Date	<i>k</i>	Diameter	<i>i</i>	<i>q</i>	<i>Q</i>	Central Meridian		Universal Time of Transit of Zero Meridian	
						Of Date	Of Intermediate Date	Of Date	Of Intermediate Date
		"	°	"	°	°	°	h m	h m
Apr. 1	0.901	5.65	36.77	0.56	253.43	209.63	199.80	10 18.4	10 58.8
3	0.899	5.69	37.08	0.58	252.98	189.97	180.14	11 39.2	12 19.6
5	0.897	5.74	37.38	0.59	252.55	170.31	160.47	13 00.1	13 40.5
7	0.896	5.79	37.68	0.60	252.12	150.64	140.80	14 21.0	15 01.5
9	0.894	5.84	37.98	0.62	251.71	130.96	121.11	15 41.9	16 22.4
11	0.893	5.89	38.28	0.63	251.32	111.27	101.42	17 02.9	17 43.4
13	0.891	5.94	38.57	0.65	250.93	91.58	81.72	18 23.9	19 04.4
15	0.889	5.99	38.86	0.66	250.56	71.87	62.02	19 44.9	20 25.5
17	0.888	6.04	39.15	0.68	250.21	52.16	42.31	21 06.0	21 46.6
19	0.886	6.10	39.44	0.69	249.87	32.45	22.59	22 27.1	23 07.7
21	0.885	6.15	39.72	0.71	249.54	12.72	2.86	23 48.2	.. .. .
23	0.883	6.20	39.99	0.72	249.23	353.00	343.13	0 28.8	1 09.4
25	0.882	6.26	40.26	0.74	248.93	333.26	323.39	1 50.0	2 30.6
27	0.880	6.31	40.53	0.76	248.64	313.52	303.65	3 11.1	3 51.8
29	0.879	6.37	40.80	0.77	248.37	293.78	283.90	4 32.4	5 13.0
May 1	0.877	6.43	41.06	0.79	248.12	274.03	264.15	5 53.6	6 34.2
3	0.876	6.49	41.32	0.81	247.88	254.27	244.39	7 14.8	7 55.5
5	0.874	6.54	41.57	0.82	247.65	234.51	224.63	8 36.1	9 16.8
7	0.873	6.60	41.82	0.84	247.44	214.75	204.87	9 57.4	10 38.1
9	0.871	6.66	42.07	0.86	247.24	194.98	185.10	11 18.7	11 59.4
11	0.870	6.72	42.31	0.88	247.06	175.21	165.33	12 40.0	13 20.7
13	0.868	6.79	42.55	0.89	246.89	155.44	145.55	14 01.3	14 42.0
15	0.867	6.85	42.79	0.91	246.74	135.67	125.78	15 22.7	16 03.3
17	0.866	6.91	43.02	0.93	246.60	115.89	106.00	16 44.0	17 24.7
19	0.864	6.98	43.24	0.95	246.47	96.12	86.23	18 05.3	18 46.0
21	0.863	7.04	43.46	0.97	246.36	76.34	66.45	19 26.7	20 07.3
23	0.862	7.11	43.68	0.98	246.27	56.57	46.68	20 48.0	21 28.7
25	0.860	7.17	43.89	1.00	246.19	36.79	26.91	22 09.3	22 50.0
27	0.859	7.24	44.09	1.02	246.13	17.02	7.14	23 30.6	.. .. .
29	0.858	7.31	44.29	1.04	246.08	357.25	347.37	0 11.3	0 51.9
31	0.857	7.38	44.49	1.06	246.04	337.49	327.61	1 32.6	2 13.2
June 2	0.855	7.45	44.68	1.08	246.02	317.73	307.85	2 53.9	3 34.5
4	0.854	7.52	44.87	1.10	246.01	297.97	288.09	4 15.1	4 55.7
6	0.853	7.60	45.05	1.11	246.01	278.22	268.34	5 36.4	6 17.0
8	0.852	7.67	45.22	1.13	246.03	258.47	248.60	6 57.6	7 38.2
10	0.851	7.74	45.39	1.15	246.06	238.73	228.86	8 18.8	8 59.3
12	0.850	7.82	45.55	1.17	246.11	218.99	209.13	9 39.9	10 20.5
14	0.849	7.90	45.71	1.19	246.17	199.26	189.40	11 01.0	11 41.6
16	0.848	7.98	45.86	1.21	246.24	179.55	169.69	12 22.1	13 02.7
18	0.847	8.06	46.00	1.23	246.33	159.84	149.99	13 43.2	14 23.7
20	0.847	8.14	46.14	1.25	246.43	140.14	130.29	15 04.2	15 44.7
22	0.846	8.22	46.27	1.27	246.54	120.45	110.61	16 25.1	17 05.6
24	0.845	8.30	46.39	1.29	246.67	100.77	90.93	17 46.0	18 26.5
26	0.844	8.39	46.51	1.31	246.80	81.10	71.27	19 06.9	19 47.3
28	0.843	8.48	46.62	1.32	246.95	61.44	51.62	20 27.7	21 08.1
30	0.843	8.57	46.72	1.34	247.11	41.80	31.98	21 48.5	22 28.9
July 2	0.842	8.66	46.81	1.36	247.28	22.16	12.35	23 09.2	23 49.5

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS
FOR 0^h UNIVERSAL TIME

Date	Light-Time	Stellar Magnitude	<i>P</i>	<i>A</i> _⊕ +180°	<i>D</i> _⊕	<i>A</i> _⊙ - <i>A</i> _⊕	<i>D</i> _⊙	⊙♂
	m		°	°	°	°	°	°
July 2	8.99	+0.3	327.88	110.39	-21.29	-50.43	-21.06	242.15
4	8.89	0.2	327.48	111.82	21.04	50.53	21.32	243.41
6	8.80	0.2	327.09	113.23	20.78	50.60	21.56	244.68
8	8.71	0.2	326.73	114.63	20.51	50.66	21.79	245.95
10	8.61	0.2	326.38	116.02	20.23	50.70	22.01	247.22
12	8.52	+0.2	326.06	117.39	-19.94	-50.72	-22.22	248.49
14	8.43	0.1	325.76	118.75	19.64	50.72	22.42	249.76
16	8.33	0.1	325.48	120.09	19.34	50.71	22.61	251.03
18	8.24	0.1	325.22	121.41	19.02	50.67	22.78	252.30
20	8.15	+0.1	324.98	122.72	18.70	50.61	22.95	253.57
22	8.05	0.0	324.76	124.01	-18.38	-50.54	-23.10	254.83
24	7.96	0.0	324.56	125.29	18.05	50.44	23.24	256.10
26	7.87	0.0	324.38	126.55	17.71	50.33	23.37	257.37
28	7.78	0.0	324.22	127.78	17.37	50.19	23.49	258.63
30	7.68	-0.1	324.08	129.00	17.03	50.04	23.59	259.90
Aug. 1	7.59	-0.1	323.96	130.21	-16.68	-49.87	-23.68	261.16
3	7.50	0.1	323.85	131.40	16.33	49.68	23.76	262.43
5	7.41	0.1	323.76	132.56	15.98	49.47	23.83	263.69
7	7.32	0.2	323.69	133.70	15.62	49.24	23.89	264.95
9	7.23	0.2	323.63	134.83	15.26	48.99	23.93	266.20
11	7.13	-0.2	323.59	135.93	-14.91	-48.72	-23.96	267.46
13	7.04	0.3	323.57	137.02	14.56	48.42	23.98	268.72
15	6.95	0.3	323.56	138.08	14.21	48.11	23.99	269.97
17	6.86	0.3	323.57	139.12	13.86	47.78	23.98	271.22
19	6.77	0.3	323.58	140.13	13.52	47.43	23.96	272.47
21	6.68	-0.4	323.61	141.12	-13.18	-47.06	-23.93	273.72
23	6.59	0.4	323.65	142.09	12.84	46.66	23.89	274.96
25	6.50	0.4	323.70	143.03	12.50	46.24	23.84	276.21
27	6.41	0.5	323.76	143.94	12.18	45.80	23.77	277.45
29	6.32	0.5	323.82	144.83	11.87	45.34	23.69	278.69
31	6.23	-0.5	323.90	145.70	-11.56	-44.86	-23.60	279.92
Sept. 2	6.14	0.6	323.98	146.53	11.26	44.35	23.50	281.16
4	6.05	0.6	324.06	147.34	10.97	43.82	23.39	282.39
6	5.96	0.6	324.15	148.12	10.69	43.27	23.27	283.62
8	5.87	0.7	324.24	148.86	10.42	42.69	23.14	284.84
10	5.78	-0.7	324.34	149.57	-10.16	-42.08	-22.99	286.06
12	5.69	0.8	324.44	150.25	9.92	41.44	22.84	287.28
14	5.61	0.8	324.53	150.89	9.70	40.77	22.68	288.50
16	5.52	0.8	324.62	151.50	9.49	40.08	22.50	289.72
18	5.44	0.9	324.72	152.07	9.29	39.35	22.31	290.93
20	5.36	-0.9	324.81	152.60	- 9.11	-38.59	-22.12	292.14
22	5.27	1.0	324.89	153.09	8.96	37.80	21.92	293.34
24	5.19	1.0	324.97	153.53	8.82	36.98	21.70	294.54
26	5.11	1.0	325.04	153.94	8.70	36.12	21.48	295.74
28	5.03	1.1	325.10	154.30	8.60	35.22	21.25	296.94
30	4.95	-1.1	325.16	154.62	- 8.52	-34.29	-21.01	298.13
Oct. 2	4.88	-1.2	325.20	154.89	- 8.47	-33.31	-20.76	299.32

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS

FOR 0^h UNIVERSAL TIME

Date	<i>k</i>	Diameter	<i>i</i>	<i>q</i>	<i>Q</i>	Central Meridian		Universal Time of Transit of Zero Meridian	
						Of Date	Of Intermediate Date	Of Date	Of Intermediate Date
July	2	0.842	8.66	46.81	1.36	247.28	22.16	12.35	23 09.2
	4	0.842	8.75	46.90	1.38	247.47	2.54	352.74	0 29.9
	6	0.841	8.84	46.98	1.40	247.66	342.94	333.14	1 50.5
	8	0.841	8.93	47.05	1.42	247.87	323.34	313.55	2 30.7
	10	0.840	9.03	47.11	1.44	248.09	303.76	293.98	3 51.2
	12	0.840	9.13	47.16	1.46	248.31	284.20	274.42	5 11.7
	14	0.840	9.23	47.20	1.48	248.55	264.64	254.88	6 32.1
	16	0.839	9.33	47.24	1.50	248.80	245.11	235.35	7 52.4
	18	0.839	9.44	47.26	1.52	249.05	225.59	215.84	9 12.6
	20	0.839	9.55	47.27	1.54	249.31	206.09	196.34	10 32.8
	22	0.839	9.66	47.27	1.55	249.59	186.60	176.87	11 52.9
	24	0.839	9.77	47.26	1.57	249.87	167.14	157.41	13 12.9
	26	0.840	9.88	47.24	1.59	250.15	147.69	137.97	14 32.8
	28	0.840	10.00	47.20	1.60	250.45	128.25	118.54	15 52.7
	30	0.840	10.12	47.16	1.62	250.75	108.84	99.14	17 12.5
Aug.	1	0.840	10.24	47.10	1.64	251.05	89.44	79.75	18 32.2
	3	0.841	10.37	47.03	1.65	251.36	70.06	60.38	19 51.8
	5	0.841	10.50	46.94	1.67	251.68	50.70	41.03	21 11.3
	7	0.842	10.63	46.84	1.68	252.00	31.36	21.70	22 30.8
	9	0.843	10.76	46.72	1.69	252.33	12.04	2.39	23 50.2
	11	0.844	10.90	46.59	1.70	252.66	352.75	343.11	0 29.8
	13	0.845	11.04	46.44	1.72	252.99	333.47	323.84	1 49.0
	15	0.846	11.19	46.28	1.73	253.32	314.22	304.60	3 08.2
	17	0.847	11.34	46.09	1.74	253.66	294.99	285.38	4 27.2
	19	0.848	11.49	45.89	1.75	253.99	275.78	266.18	5 46.1
	21	0.849	11.65	45.67	1.75	254.33	256.59	247.01	7 04.9
	23	0.851	11.81	45.42	1.76	254.66	237.44	227.86	8 23.6
	25	0.853	11.97	45.15	1.76	254.99	218.30	208.74	9 42.2
	27	0.854	12.14	44.87	1.77	255.32	199.19	189.64	11 00.8
	29	0.856	12.32	44.56	1.77	255.65	180.10	170.57	12 19.1
Sept.	31	0.858	12.49	44.22	1.77	255.98	161.05	151.53	13 37.4
	2	0.860	12.68	43.86	1.77	256.30	142.02	132.51	14 55.6
	4	0.863	12.86	43.47	1.76	256.61	123.02	113.53	16 13.6
	6	0.865	13.05	43.06	1.76	256.91	104.05	94.57	17 31.5
	8	0.868	13.25	42.62	1.75	257.21	85.11	75.65	18 49.2
	10	0.871	13.45	42.14	1.74	257.50	66.20	56.76	20 06.8
	12	0.874	13.66	41.63	1.73	257.78	47.33	37.91	21 24.3
	14	0.877	13.87	41.08	1.71	258.05	28.49	19.09	22 41.6
	16	0.880	14.08	40.50	1.69	258.31	9.69	0.31	23 58.7
	18	0.884	14.30	39.89	1.66	258.56	350.93	341.56	0 37.3
	20	0.887	14.53	39.23	1.64	258.79	332.20	322.86	1 54.2
	22	0.891	14.76	38.53	1.61	259.01	313.52	304.19	3 10.9
	24	0.895	14.99	37.80	1.57	259.21	294.87	285.57	4 27.4
	26	0.899	15.22	37.02	1.53	259.39	276.27	266.98	5 43.8
	28	0.904	15.46	36.19	1.49	259.56	257.71	248.45	7 00.0
Oct.	30	0.908	15.70	35.32	1.44	259.71	239.20	229.96	8 15.9
	2	0.913	15.94	34.40	1.39	259.84	220.73	211.51	9 31.7

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS
FOR 0^h UNIVERSAL TIME

Date	Light-Time	Stellar Magnitude	<i>P</i>	<i>A</i> _⊕ +180°	<i>D</i> _⊕	<i>A</i> _⊙ - <i>A</i> _⊕	<i>D</i> _⊙	☉♂
	m		°	°	°	°	°	°
Oct. 2	4.88	-1.2	325.20	154.89	- 8.47	-33.31	-20.76	299.32
4	4.80	1.2	325.24	155.11	8.44	32.30	20.50	300.50
6	4.73	1.3	325.26	155.28	8.43	31.24	20.24	301.68
8	4.66	1.3	325.27	155.40	8.45	30.14	19.97	302.86
10	4.60	1.3	325.27	155.47	8.50	28.99	19.69	304.04
12	4.53	-1.4	325.26	155.48	- 8.58	-27.80	-19.40	305.21
14	4.47	1.4	325.23	155.44	8.68	26.56	19.11	306.37
16	4.41	1.5	325.19	155.35	8.81	25.28	18.81	307.54
18	4.36	1.5	325.14	155.20	8.97	23.95	18.50	308.70
20	4.31	1.6	325.08	154.99	9.15	22.57	18.18	309.86
22	4.26	-1.6	325.00	154.74	- 9.36	-21.15	-17.86	311.01
24	4.22	1.7	324.92	154.43	9.59	19.69	17.54	312.16
26	4.18	1.7	324.82	154.07	9.85	18.18	17.21	313.30
28	4.15	1.7	324.72	153.67	10.13	16.64	16.87	314.44
30	4.12	1.8	324.61	153.22	10.43	15.05	16.53	315.58
Nov. 1	4.09	-1.8	324.50	152.72	-10.75	-13.43	-16.18	316.72
3	4.07	1.8	324.38	152.19	11.09	11.78	15.83	317.85
5	4.06	1.9	324.25	151.62	11.44	10.11	15.48	318.97
7	4.05	1.9	324.13	151.02	11.80	8.41	15.12	320.09
9	4.05	1.9	324.01	150.40	12.17	6.69	14.75	321.21
11	4.06	-1.9	323.89	149.76	-12.55	- 4.96	-14.38	322.33
13	4.07	2.0	323.78	149.11	12.93	3.23	14.01	323.44
15	4.09	2.0	323.67	148.45	13.30	- 1.50	13.64	324.55
17	4.11	2.0	323.56	147.79	13.67	+ 0.22	13.26	325.65
19	4.14	1.9	323.47	147.14	14.04	1.93	12.88	326.75
21	4.17	-1.9	323.38	146.51	-14.39	+ 3.62	-12.50	327.85
23	4.21	1.8	323.30	145.89	14.73	5.28	12.11	328.94
25	4.26	1.8	323.23	145.30	15.06	6.91	11.72	330.03
27	4.32	1.7	323.17	144.74	15.37	8.50	11.33	331.11
29	4.38	1.7	323.12	144.22	15.66	10.05	10.93	332.19
Dec. 1	4.44	-1.6	323.07	143.73	-15.93	+11.56	-10.54	333.27
3	4.51	1.5	323.03	143.28	16.18	13.02	10.14	334.34
5	4.59	1.5	322.99	142.88	16.40	14.43	9.74	335.41
7	4.67	1.4	322.96	142.52	16.60	15.79	9.34	336.48
9	4.76	1.3	322.94	142.21	16.78	17.09	8.94	337.54
11	4.85	-1.3	322.91	141.96	-16.94	+18.34	- 8.53	338.60
13	4.95	1.2	322.90	141.76	17.07	19.53	8.13	339.65
15	5.05	1.1	322.88	141.61	17.18	20.65	7.72	340.70
17	5.16	1.1	322.87	141.51	17.27	21.72	7.31	341.75
19	5.27	1.0	322.86	141.47	17.33	22.73	6.91	342.79
21	5.38	-0.9	322.85	141.48	-17.37	+23.69	- 6.50	343.84
23	5.50	0.9	322.84	141.53	17.39	24.59	6.09	344.87
25	5.62	0.8	322.84	141.64	17.39	25.44	5.68	345.90
27	5.74	0.8	322.83	141.79	17.37	26.23	5.27	346.93
29	5.87	0.7	322.83	141.99	17.33	26.98	4.86	347.96
31	6.00	-0.6	322.84	142.23	-17.27	+27.68	- 4.45	348.98
33	6.13	-0.6	322.84	142.52	-17.19	+28.33	- 4.04	350.00

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS

FOR 0^h UNIVERSAL TIME

Date	<i>k</i>	Diameter	<i>i</i>	<i>q</i>	<i>Q</i>	Central Meridian		Universal Time of Transit of Zero Meridian	
						Of Date	Of Intermediate Date	Of Date	Of Intermediate Date
		"	°	"	°	°	°	h m	h m
Oct. 2	0.913	15.94	34.40	1.39	259.84	220.73	211.51	9 31.7	10 09.5
4	0.917	16.19	33.43	1.34	259.94	202.31	193.12	10 47.3	11 25.0
6	0.922	16.43	32.40	1.28	260.03	183.94	174.78	12 02.6	12 40.2
8	0.927	16.68	31.32	1.21	260.09	165.62	156.48	13 17.8	13 55.2
10	0.932	16.92	30.19	1.15	260.12	147.36	138.24	14 32.7	15 10.0
12	0.937	17.16	29.00	1.08	260.13	129.14	120.05	15 47.3	16 24.6
14	0.942	17.39	27.76	1.00	260.11	110.98	101.92	17 01.8	17 38.9
16	0.948	17.62	26.46	0.92	260.07	92.87	83.84	18 16.0	18 53.0
18	0.953	17.84	25.10	0.84	259.99	74.82	65.81	19 30.0	20 06.9
20	0.958	18.05	23.69	0.76	259.89	56.82	47.84	20 43.7	21 20.5
22	0.963	18.25	22.22	0.68	259.75	38.87	29.92	21 57.3	22 33.9
24	0.968	18.43	20.70	0.60	259.59	20.97	12.04	23 10.6	23 47.2
26	0.972	18.60	19.13	0.51	259.39	3.12	354.22	...	0 23.7
28	0.977	18.76	17.51	0.43	259.15	345.32	336.44	1 00.2	1 36.6
30	0.981	18.89	15.85	0.36	258.87	327.56	318.70	2 13.0	2 49.4
Nov. 1	0.985	19.00	14.14	0.29	258.55	309.85	301.00	3 25.7	4 01.9
3	0.988	19.09	12.40	0.22	258.17	292.17	283.34	4 38.1	5 14.3
5	0.991	19.15	10.62	0.16	257.71	274.52	265.71	5 50.5	6 26.6
7	0.994	19.18	8.82	0.11	257.14	256.91	248.11	7 02.7	7 38.8
9	0.996	19.19	7.00	0.07	256.39	239.31	230.52	8 14.8	8 50.9
11	0.998	19.17	5.16	0.04	255.28	221.74	212.95	9 26.9	10 02.9
13	0.999	19.12	3.32	0.02	253.22	204.17	195.39	10 38.9	11 14.9
15	1.000	19.04	1.49	0.00	246.75	186.61	177.83	11 50.9	12 26.9
17	1.000	18.93	0.47	0.00	115.80	169.04	160.26	13 02.9	13 39.0
19	1.000	18.80	2.21	0.01	84.96	151.47	142.68	14 15.0	14 51.1
21	0.999	18.64	4.00	0.02	81.29	133.88	125.08	15 27.1	16 03.3
23	0.998	18.45	5.77	0.05	79.76	116.27	107.46	16 39.4	17 15.6
25	0.996	18.25	7.51	0.08	78.83	98.63	89.80	17 51.8	18 28.0
27	0.994	18.02	9.21	0.12	78.17	80.96	72.12	19 04.3	19 40.6
29	0.991	17.77	10.87	0.16	77.66	63.26	54.39	20 16.9	20 53.3
Dec. 1	0.988	17.51	12.48	0.21	77.24	45.52	36.63	21 29.8	22 06.3
3	0.985	17.24	14.04	0.26	76.88	27.73	18.82	22 42.8	23 19.4
5	0.982	16.95	15.56	0.31	76.57	9.90	0.97	23 56.0	...
7	0.978	16.65	17.01	0.36	76.29	352.02	343.06	0 32.7	1 09.5
9	0.974	16.34	18.41	0.42	76.05	334.09	325.10	1 46.3	2 23.2
11	0.971	16.03	19.75	0.47	75.84	316.11	307.10	3 00.1	3 37.1
13	0.967	15.72	21.03	0.52	75.65	298.07	289.03	4 14.1	4 51.2
15	0.963	15.40	22.25	0.57	75.49	279.98	270.91	5 28.4	6 05.6
17	0.959	15.09	23.41	0.62	75.35	261.83	252.74	6 42.9	7 20.2
19	0.955	14.77	24.52	0.67	75.23	243.63	234.51	7 57.6	8 35.0
21	0.951	14.46	25.56	0.71	75.13	225.38	216.24	9 12.5	9 50.1
23	0.947	14.15	26.55	0.75	75.05	207.08	197.91	10 27.7	11 05.3
25	0.944	13.84	27.49	0.78	74.99	188.73	179.53	11 43.1	12 20.8
27	0.940	13.54	28.37	0.81	74.95	170.33	161.11	12 58.6	13 36.5
29	0.937	13.25	29.21	0.84	74.93	151.88	142.64	14 14.4	14 52.4
31	0.933	12.96	29.99	0.87	74.92	133.39	124.13	15 30.4	16 08.4
33	0.930	12.68	30.72	0.89	74.93	114.86	105.57	16 46.6	17 24.7

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER

FOR 0^h UNIVERSAL TIME

Date		Light-Time	Stellar Magnitude	<i>P</i>	<i>A</i> _♃ +180°	<i>D</i> _♃	<i>A</i> _♁ +180°	<i>D</i> _♁
		m		°	°	°	°	°
Jan.	- 3	47.76	-1.4	22.22	71.75	-2.90	62.13	-2.71
	5	46.74	1.5	22.01	72.77	2.95	62.73	2.73
	13	45.69	1.5	21.82	73.64	3.00	63.34	2.74
	21	44.61	1.6	21.66	74.35	3.04	63.94	2.76
	29	43.53	1.6	21.53	74.87	3.08	64.55	2.77
Feb.	6	42.48	-1.7	21.45	75.21	-3.12	65.15	-2.79
	14	41.46	1.8	21.42	75.35	3.15	65.75	2.80
	22	40.50	1.8	21.43	75.29	3.18	66.36	2.81
Mar.	2	39.62	1.9	21.49	75.03	3.20	66.96	2.83
	10	38.83	1.9	21.59	74.58	3.22	67.57	2.84
Apr.	18	38.16	-1.9	21.73	73.95	-3.23	68.18	-2.85
	26	37.63	2.0	21.90	73.16	3.23	68.78	2.86
	3	37.24	2.0	22.10	72.26	3.22	69.39	2.87
	11	37.01	2.0	22.31	71.28	3.20	69.99	2.89
	19	36.94	2.0	22.51	70.26	3.17	70.60	2.90
May	27	37.03	-2.0	22.71	69.24	-3.14	71.21	-2.91
	5	37.28	2.0	22.90	68.28	3.10	71.81	2.92
	13	37.68	2.0	23.06	67.41	3.05	72.42	2.93
	21	38.21	1.9	23.19	66.68	3.01	73.02	2.94
	29	38.87	1.9	23.29	66.10	2.96	73.63	2.95
June	6	39.64	-1.9	23.36	65.69	-2.92	74.24	-2.95
	14	40.49	1.8	23.40	65.48	2.88	74.85	2.96
	22	41.42	1.8	23.41	65.45	2.84	75.45	2.97
	30	42.39	1.7	23.38	65.62	2.81	76.06	2.98
July	8	43.40	1.7	23.32	65.97	2.78	76.67	2.99
	16	44.43	-1.6	23.23	66.50	-2.76	77.28	-2.99
	24	45.45	1.6	23.11	67.19	2.75	77.88	3.00
Aug.	1	46.46	1.5	22.96	68.04	2.74	78.49	3.01
	9	47.44	1.5	22.77	69.04	2.73	79.10	3.01
	17	48.37	1.4	22.56	70.16	2.73	79.71	3.02
Sept.	25	49.25	-1.4	22.31	71.40	-2.74	80.32	-3.03
	2	50.07	1.3	22.03	72.74	2.75	80.93	3.03
	10	50.81	1.3	21.71	74.17	2.76	81.54	3.04
	18	51.47	1.3	21.37	75.69	2.77	82.15	3.04
	26	52.03	1.3	20.99	77.27	2.79	82.76	3.05
Oct.	4	52.50	-1.2	20.58	78.91	-2.81	83.37	-3.05
	12	52.87	-1.2	20.14	80.59	-2.83	83.98	-3.05
Nov.	29	52.70	-1.2	17.03	91.04	-2.96	87.66	-3.07
Dec.	7	52.27	1.3	16.47	92.74	2.98	88.27	3.07
	15	51.74	-1.3	15.90	94.39	-3.00	88.88	-3.07
	23	51.10	1.3	15.34	95.98	3.02	89.49	3.07
	31	50.37	1.4	14.79	97.50	3.04	90.11	3.07
	39	49.56	-1.4	14.26	98.94	-3.06	90.72	-3.07

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER

FOR 0^h UNIVERSAL TIME

Date	Equatorial Diameter	Excess of Equat. Diameter over Polar	i	q	Q	Central Meridian		Correction for Phase
						System I	System II	
Jan. - 3	34.26	2.28	9.62	0.24	291.36	271.05	326.09	+0.40
5	35.01	2.33	10.03	0.27	291.01	93.86	87.85	0.44
13	35.82	2.39	10.29	0.29	290.68	276.83	209.78	0.46
21	36.68	2.45	10.39	0.30	290.37	99.98	331.88	0.47
29	37.59	2.51	10.32	0.30	290.09	283.31	94.17	0.46
Feb. 6	38.53	2.57	10.05	0.30	289.82	106.82	216.63	+0.44
14	39.47	2.63	9.59	0.28	289.56	290.50	339.26	0.40
22	40.41	2.69	8.92	0.24	289.31	114.34	102.06	0.35
Mar. 2	41.31	2.75	8.06	0.20	289.02	298.34	225.02	0.28
10	42.14	2.81	7.00	0.16	288.67	122.47	348.11	0.21
18	42.88	2.86	5.77	0.11	288.15	306.71	111.30	+0.14
26	43.49	2.90	4.39	0.06	287.28	131.02	234.57	0.08
Apr. 3	43.94	2.93	2.88	0.03	285.37	315.36	357.87	0.04
11	44.22	2.95	1.31	0.01	278.59	139.69	121.15	+0.01
19	44.31	2.95	0.44	0.00	150.52	323.95	244.37	0.00
27	44.20	2.95	1.98	0.01	119.31	148.11	7.49	-0.02
May 5	43.90	2.93	3.54	0.04	115.71	332.12	130.46	0.05
13	43.44	2.90	5.00	0.08	114.36	155.94	253.25	0.11
21	42.83	2.86	6.34	0.13	113.66	339.55	15.82	0.18
29	42.10	2.81	7.53	0.18	113.21	162.93	138.16	0.25
June 6	41.28	2.75	8.54	0.23	112.89	346.07	260.26	-0.32
14	40.41	2.69	9.36	0.27	112.63	168.96	22.12	0.38
22	39.51	2.63	9.99	0.30	112.39	351.62	143.75	0.43
30	38.60	2.57	10.43	0.32	112.17	174.06	265.15	0.47
July 8	37.71	2.51	10.69	0.33	111.95	356.30	26.35	0.50
16	36.84	2.46	10.77	0.32	111.72	178.34	147.36	-0.50
24	36.01	2.40	10.68	0.31	111.47	0.22	268.21	0.50
Aug. 1	35.23	2.35	10.44	0.29	111.20	181.96	28.91	0.47
9	34.50	2.30	10.06	0.26	110.91	3.57	149.49	0.44
17	33.83	2.26	9.54	0.23	110.58	185.07	269.96	0.40
25	33.22	2.22	8.91	0.20	110.22	6.50	30.35	-0.35
Sept. 2	32.68	2.18	8.18	0.17	109.81	187.86	150.67	0.29
10	32.21	2.15	7.36	0.13	109.34	9.17	270.95	0.24
18	31.80	2.12	6.46	0.10	108.80	190.46	31.20	0.18
26	31.45	2.10	5.49	0.07	108.15	11.73	151.44	0.13
Oct. 4	31.17	2.08	4.46	0.05	107.34	193.01	271.68	-0.09
12	30.96	2.06	3.39	0.03	106.21	14.30	31.93	-0.05
Nov. 29	31.06	2.07	3.39	0.03	289.00	23.16	34.54	+0.05
Dec. 7	31.31	2.09	4.47	0.05	287.75	204.92	155.26	0.09
15	31.63	2.11	5.50	0.07	286.78	26.80	276.09	+0.13
23	32.02	2.14	6.48	0.10	285.96	208.79	37.05	0.18
31	32.49	2.17	7.38	0.13	285.23	30.91	158.13	0.24
39	33.02	2.20	8.20	0.17	284.56	213.17	279.34	+0.29

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,
SYSTEM IFOR 0^h UNIVERSAL TIME*Longitude of Central Meridian of Illuminated Disk*

Jan.	1	182.9	Feb.	22	114.7	Apr.	15	51.8	June	6	345.7	July	28	270.6	Sept.	18	190.3
	2	340.7		23	272.7		16	209.9		7	143.6		29	68.3		19	347.9
	3	138.6		24	70.7		17	7.9		8	301.5		30	226.0		20	145.6
	4	296.4		25	228.7		18	165.9		9	99.3		31	23.8		21	303.3
	5	94.3		26	26.7		19	323.9		10	257.2	Aug.	1	181.5		22	100.9
	6	252.2		27	184.6		20	122.0		11	55.0		2	339.2		23	258.6
	7	50.0		28	342.6		21	280.0		12	212.9		3	136.9		24	56.3
	8	207.9	Mar.	1	140.6		22	78.0		13	10.7		4	294.6		25	213.9
	9	5.8		2	298.6		23	236.0		14	168.6		5	92.3		26	11.6
	10	163.7		3	96.6		24	34.0		15	326.4		6	250.0		27	169.3
	11	321.5		4	254.6		25	192.1		16	124.2		7	47.7		28	326.9
	12	119.4		5	52.6		26	350.1		17	282.1		8	205.4		29	124.6
	13	277.3		6	210.7		27	148.1		18	79.9		9	3.1		30	282.3
	14	75.2		7	8.7		28	306.1		19	237.7		10	160.8	Oct.	1	79.9
	15	233.1		8	166.7		29	104.1		20	35.5		11	318.5		2	237.6
	16	31.0		9	324.7		30	262.1		21	193.4		12	116.2		3	35.3
	17	188.9		10	122.7	May	1	60.1		22	351.2		13	273.9		4	192.9
	18	346.8		11	280.7		2	218.1		23	149.0		14	71.6		5	350.6
	19	144.7		12	78.7		3	16.1		24	306.8		15	229.3		6	148.3
	20	302.6		13	236.8		4	174.1		25	104.6		16	27.0		7	305.9
	21	100.4		14	34.8		5	332.1		26	262.4		17	184.7		8	103.6
	22	258.4		15	192.8		6	130.0		27	60.2		18	342.4		9	294.1
	23	56.3		16	350.8		7	288.0		28	218.0		19	140.0	Dec.	3	294.1
	24	214.2		17	148.8		8	86.0		29	15.8		20	297.7		4	91.8
	25	12.1		18	306.9		9	243.9		30	173.6		21	95.4		5	249.6
	26	170.0		19	104.9		10	41.9	July	1	331.4		22	253.1		6	47.3
	27	327.9		20	262.9		11	199.9		2	129.1		23	50.8		7	205.0
	28	125.9		21	61.0		12	357.9		3	286.9		24	208.5		8	2.7
	29	283.8		22	219.0		13	155.8		4	84.7		25	6.2		9	160.5
	30	81.7		23	17.0		14	313.8		5	242.5		26	163.8		10	318.2
	31	239.6		24	175.0		15	111.7		6	40.2		27	321.5		11	116.0
Feb.	1	37.6		25	333.1		16	269.7		7	198.0		28	119.2		12	273.7
	2	195.5		26	131.1		17	67.6		8	355.8		29	276.9		13	71.4
	3	353.4		27	289.1		18	225.5		9	153.6		30	74.5		14	229.2
	4	151.4		28	87.2		19	23.5		10	311.3		31	232.2		15	26.9
	5	309.3		29	245.2		20	181.4		11	109.1	Sept.	1	29.9		16	184.7
	6	107.3		30	43.3		21	339.4		12	266.8		2	187.6		17	342.4
	7	265.2		31	201.3		22	137.3		13	64.6		3	345.2		18	140.2
	8	63.2	Apr.	1	359.3		23	295.2		14	222.3		4	142.9		19	298.0
	9	221.1		2	157.4		24	93.1		15	20.1		5	300.6		20	95.7
	10	19.1		3	315.4		25	251.0		16	177.8		6	98.3		21	253.5
	11	177.0		4	113.4		26	48.9		17	335.6		7	255.9		22	51.2
	12	335.0		5	271.5		27	206.9		18	133.3		8	53.6		23	209.0
	13	132.9		6	69.5		28	4.8		19	291.0		9	211.3		24	6.7
	14	290.9		7	227.5		29	162.7		20	88.8		10	8.9		25	164.5
	15	88.9		8	25.6		30	320.6		21	246.5		11	166.6		26	322.3
	16	246.8		9	183.6		31	118.4		22	44.3		12	324.3		27	120.1
	17	44.8		10	341.7	June	1	276.3		23	202.0		13	121.9		28	277.8
	18	202.8		11	139.7		2	74.2		24	359.7		14	279.6		29	75.6
	19	0.8		12	297.7		3	232.1		25	157.4		15	77.3		30	233.4
	20	158.7		13	95.8		4	30.0		26	315.2		16	234.9		31	31.1
	21	316.7		14	253.8		5	187.9		27	112.9		17	32.6		32	188.9

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,
SYSTEM IIFOR 0^h UNIVERSAL TIME*Longitude of Central Meridian of Illuminated Disk*

Jan.	1	207.4	Feb.	22	102.4	Apr.	15	2.8	June	6	259.9	July	28	148.1	Sept.	18	31.0
	2	357.6		23	252.8		16	153.2		7	50.2		29	298.2		19	181.1
	3	147.8		24	43.1		17	303.6		8	200.4		30	88.3		20	331.1
	4	298.1		25	193.5		18	94.0		9	350.6		31	238.3		21	121.1
	5	88.3		26	343.9		19	244.4		10	140.8	Aug.	1	28.4		22	271.2
	6	238.5		27	134.2		20	34.8		11	291.1		2	178.5		23	61.2
	7	28.8		28	284.6		21	185.1		12	81.3		3	328.6		24	211.2
	8	179.0	Mar.	1	74.9		22	335.5		13	231.5		4	118.7		25	1.3
	9	329.3		2	225.3		23	125.9		14	21.7		5	268.7		26	151.3
	10	119.5		3	15.7		24	276.3		15	171.9		6	58.8		27	301.3
	11	269.8		4	166.1		25	66.7		16	322.1		7	208.9		28	91.4
	12	60.0		5	316.4		26	217.1		17	112.3		8	359.0		29	241.4
	13	210.2		6	106.8		27	7.5		18	262.5		9	149.0		30	31.4
	14	0.5		7	257.2		28	157.8		19	52.7		10	299.1	Oct.	1	181.5
	15	150.8		8	47.6		29	308.2		20	202.9		11	89.2		2	331.5
	16	301.0		9	197.9		30	98.6		21	353.1		12	239.2		3	121.6
	17	91.3		10	348.3	May	1	248.9		22	143.3		13	29.3		4	271.6
	18	241.6		11	138.7		2	39.3		23	293.5		14	179.4		5	61.6
	19	31.8		12	289.1		3	189.7		24	83.7		15	329.4		6	211.7
	20	182.1		13	79.5		4	340.0		25	233.8		16	119.5		7	1.7
	21	332.4		14	229.9		5	130.4		26	24.0		17	269.6		8	151.7
	22	122.6		15	20.3		6	280.7		27	174.2		18	59.6		9	275.0
	23	272.9		16	170.7		7	71.1		28	324.3		19	209.7	Dec.	3	65.1
	24	63.2		17	321.1		8	221.4		29	114.5		20	359.7		4	215.2
	25	213.5		18	111.4		9	11.8		30	264.7		21	149.8		5	5.3
	26	3.8		19	261.8		10	162.1	July	1	54.8		22	299.8		6	155.4
	27	154.1		20	52.2		11	312.5		2	205.0		23	89.9		7	305.5
	28	304.3		21	202.6		12	102.8		3	355.1		24	239.9		8	95.6
	29	94.6		22	353.1		13	253.1		4	145.3		25	30.0		9	245.7
	30	244.9		23	143.5		14	43.5		5	295.4		26	180.0		10	35.8
Feb.	31	35.2		24	293.9		15	193.8		6	85.6		27	330.1		11	185.9
	1	185.5		25	84.3		16	344.1		7	235.7		28	120.1		12	336.0
	2	335.8		26	234.7		17	134.4		8	25.9		29	270.2		13	126.1
	3	126.2		27	25.1		18	284.7		9	176.0		30	60.2		14	276.2
	4	276.5		28	175.5		19	75.0		10	326.1		31	210.3		15	66.4
	5	66.8		29	325.9		20	225.3		11	116.2	Sept.	1	0.3		16	216.5
	6	217.1		30	116.3		21	15.6		12	266.4		2	150.4		17	6.6
	7	7.4		31	266.7		22	165.9		13	56.5		3	300.4		18	156.7
	8	157.7	Apr.	1	57.1		23	316.2		14	206.6		4	90.5		19	306.9
	9	308.0		2	207.5		24	106.5		15	356.7		5	240.5		20	97.0
	10	98.4		3	357.9		25	256.8		16	146.9		6	30.5		21	247.1
	11	248.7		4	148.3		26	47.1		17	297.0		7	180.6		22	37.2
	12	39.0		5	298.7		27	197.3		18	87.1		8	330.6		23	187.4
	13	189.3		6	89.1		28	347.6		19	237.2		9	120.7		24	337.5
	14	339.7		7	239.5		29	137.9		20	27.3		10	270.7		25	127.7
	15	130.0		8	29.9		30	288.2		21	177.4		11	60.8		26	277.8
	16	280.3		9	180.3		31	78.4		22	327.5		12	210.8		27	68.0
	17	70.7		10	330.8	June	1	228.7		23	117.6		13	0.8		28	218.1
	18	221.0		11	121.2		2	18.9		24	267.7		14	150.9		29	8.2
	19	11.4		12	271.6		3	169.2		25	57.8		15	300.9		30	158.4
	20	161.7		13	62.0		4	319.4		26	207.9		16	90.9		31	308.5
	21	312.1		14	212.4		5	109.7		27	358.0		17	241.0		32	

PART V

SATELLITES

UNIVERSAL TIME

PHOBOS
Eastern Elongation

Oct.	d	h	Nov.	d	h	Nov.	d	h	Nov.	d	h	Dec.	d	h
	24	03.6		2	17.1		12	06.7		21	20.3		1	09.8
	24	11.2		3	00.8		12	14.4		22	03.9		1	17.5
	24	18.9		3	08.5		12	22.0		22	11.6		2	01.1
	25	02.5		3	16.1		13	05.6		22	19.2		2	08.8
	25	10.2		3	23.8		13	13.3		23	02.9		2	16.4
	25	17.8		4	07.4		13	21.0		23	10.5		3	00.1
	26	01.5		4	15.1		14	04.6		23	18.2		3	07.7
	26	09.1		4	22.7		14	12.3		24	01.8		3	15.4
	26	16.8		5	06.4		14	19.9		24	09.5		3	23.0
	27	00.5		5	14.0		15	03.6		24	17.1		4	06.7
	27	08.1		5	21.7		15	11.2		25	00.8		4	14.3
	27	15.8		6	05.3		15	18.9		25	08.4		4	22.0
	27	23.4		6	13.0		16	02.5		25	16.1		5	05.7
	28	07.1		6	20.6		16	10.2		25	23.7		5	13.3
	28	14.7		7	04.3		16	17.8		26	07.4		5	21.0
	28	22.4		7	11.9		17	01.5		26	15.0		6	04.6
	29	06.0		7	19.6		17	09.1		26	22.7		6	12.3
	29	13.7		8	03.2		17	16.8		27	06.3		6	19.9
	29	21.3		8	10.9		18	00.4		27	14.0		7	03.6
	30	05.0		8	18.5		18	08.1		27	21.6		7	11.2
	30	12.6		9	02.2		18	15.7		28	05.3		7	18.9
	30	20.3		9	09.8		18	23.4		28	12.9		8	02.5
	31	03.9		9	17.5		19	07.1		28	20.6		8	10.2
	31	11.6		10	01.2		19	14.7		29	04.2		8	17.8
	31	19.3		10	08.8		19	22.3		29	11.9		9	01.5
Nov.	1	02.9		10	16.5		20	06.0		29	19.6		9	09.1
	1	10.6		11	00.1		20	13.6		30	03.2		9	16.8
	1	18.2		11	07.7		20	21.3		30	10.9		10	00.4
	2	01.8		11	15.4		21	05.0		30	18.5		10	08.1
	2	09.5		11	23.0		21	12.6	Dec.	1	02.2		10	15.7

PHOBOS

Time from Eastern Elongation	p^1	F	Time from Eastern Elongation	p^1	F	Time from Eastern Elongation	p^1	F	Time from Eastern Elongation	p^1	F
h m	°		h m	°		h m	°		h m	°	
0 00	51.0	1.000	2 00	302.4	0.222	4 00	229.3	0.990	6 00	95.3	0.295
0 10	49.3	0.991	2 10	276.0	0.292	4 10	227.5	0.963	6 10	81.0	0.396
0 20	47.6	0.964	2 20	261.5	0.392	4 20	225.7	0.919	6 20	72.7	0.504
0 30	45.8	0.921	2 30	253.0	0.499	4 30	223.6	0.858	6 30	67.4	0.609
0 40	43.7	0.861	2 40	247.5	0.605	4 40	221.1	0.783	6 40	63.5	0.706
0 50	41.2	0.786	2 50	243.6	0.702	4 50	218.1	0.695	6 50	60.6	0.793
1 00	38.2	0.699	3 00	240.7	0.789	5 00	214.1	0.597	7 00	58.2	0.866
1 10	34.3	0.601	3 10	238.2	0.864	5 10	208.5	0.491	7 10	56.1	0.925
1 20	28.7	0.495	3 20	236.2	0.923	5 20	199.7	0.384	7 20	54.3	0.967
1 30	20.1	0.388	3 30	234.3	0.966	5 30	184.5	0.285	7 30	52.5	0.992
1 40	5.2	0.289	3 40	232.6	0.992	5 40	157.0	0.219	7 40	50.9	1.000
1 50	338.3	0.220	3 50	230.9	1.000	5 50	121.1	0.224			

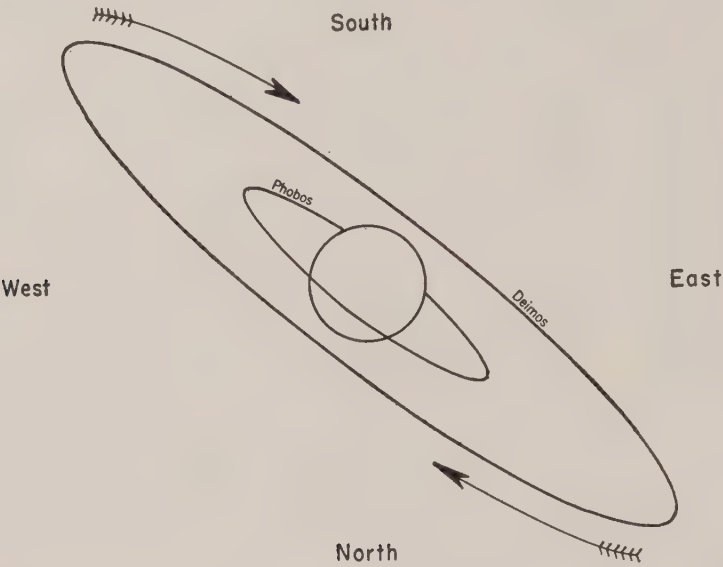
FOR 0^h UNIVERSAL TIME

Date	$P-P_0$	$\frac{a(\rho)}{\rho}$	Date	$P-P_0$	$\frac{a(\rho)}{\rho}$	Date	$P-P_0$	$\frac{a(\rho)}{\rho}$	Date	$P-P_0$	$\frac{a(\rho)}{\rho}$
	°	"		°	"		°	"		°	"
Oct. 24	+1.7	25.5	Nov. 5	+1.0	26.5	Nov.17	+0.3	26.2	Nov.29	-0.2	24.6
25	1.7	25.6	6	1.0	26.5	18	0.3	26.1	30	0.2	24.4
26	1.6	25.7	7	0.9	26.5	19	0.2	26.0	Dec. 1	0.2	24.2
27	1.6	25.8	8	0.8	26.5	20	0.2	25.9	2	0.2	24.0
28	1.5	25.9	9	0.8	26.5	21	0.1	25.8	3	0.2	23.8
29	+1.5	26.0	10	+0.7	26.5	22	+0.1	25.6	4	-0.3	23.6
30	1.4	26.1	11	0.7	26.5	23	0.0	25.5	5	0.3	23.4
31	1.3	26.2	12	0.6	26.5	24	0.0	25.4	6	0.3	23.2
Nov. 1	1.3	26.3	13	0.5	26.4	25	0.0	25.2	7	0.3	23.0
2	1.2	26.3	14	0.5	26.4	26	-0.1	25.1	8	0.3	22.8
3	+1.2	26.4	15	+0.4	26.3	27	-0.1	24.9	9	-0.3	22.6
4	+1.1	26.4	16	+0.4	26.3	28	-0.1	24.7	10	-0.3	22.4

Position angle of satellite $p=p^1+(P-P_0)$

Apparent distance of satellite $s=F\frac{a(\rho)}{\rho}$

APPARENT ORBITS OF THE SATELLITES OF MARS, AT DATE OF OPPOSITION,
NOVEMBER 16, 1958



NAMES OF THE SATELLITES

SIDEREAL PERIODS

I Phobos	7 ^h 39 ^m 13 ^s .85
II Deimos	30 17 54 .87

UNIVERSAL TIME

DEIMOS
Eastern Elongation

	d	h		d	h		d	h		d	h		d	h
Oct.	23	11.5	Nov.	2	13.7	Nov.	12	15.9	Nov.	22	18.0	Dec.	2	20.1
	24	17.8		3	20.0		13	22.1		24	00.3		4	02.4
	26	00.0		5	02.3		15	04.4		25	06.5		5	08.7
	27	06.3		6	08.5		16	10.7		26	12.8		6	15.0
	28	12.6		7	14.8		17	16.9		27	19.1		7	21.3
	29	18.9		8	21.1		18	23.2		29	01.3		9	03.6
	31	01.1		10	03.3		20	05.5		30	07.6		10	09.8
Nov.	1	07.4		11	09.6		21	11.7	Dec.	1	13.9		11	16.1

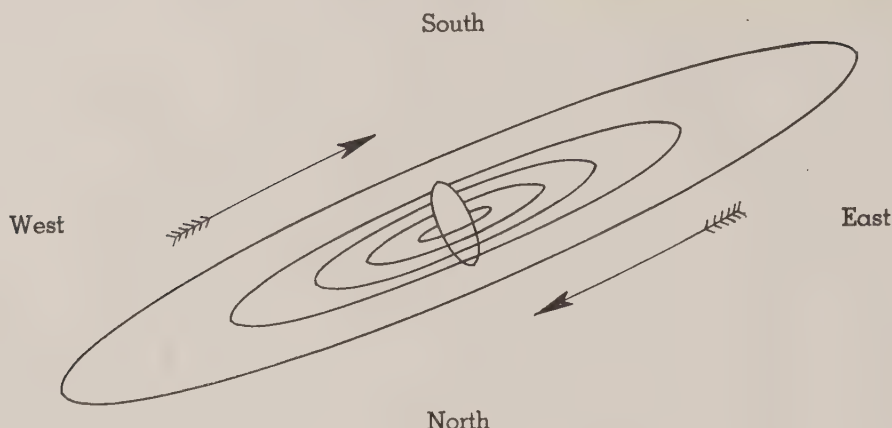
DEIMOS

Time from Eastern Elongation	p^1	F	Time from Eastern Elongation	p^1	F	Time from Eastern Elongation	p^1	F	Time from Eastern Elongation	p^1	F
h m	°		h m	°		h m	°		h m	°	
0 00	51.0	1.000	8 00	297.2	0.218	16 00	229.0	0.985	24 00	87.4	0.325
0 40	49.4	0.991	8 40	271.9	0.297	16 40	227.3	0.953	24 40	76.1	0.433
1 20	47.7	0.964	9 20	258.6	0.403	17 20	225.4	0.903	25 20	69.4	0.543
2 00	46.0	0.919	10 00	251.0	0.513	18 00	223.4	0.838	26 00	64.9	0.647
2 40	44.0	0.857	10 40	246.0	0.619	18 40	220.9	0.757	26 40	61.6	0.742
3 20	41.6	0.781	11 20	242.4	0.717	19 20	217.7	0.664	27 20	59.0	0.825
4 00	38.6	0.691	12 00	239.7	0.803	20 00	213.5	0.561	28 00	56.9	0.893
4 40	34.8	0.591	12 40	237.4	0.876	20 40	207.3	0.452	28 40	55.0	0.946
5 20	29.3	0.483	13 20	235.5	0.933	21 20	197.0	0.343	29 20	53.3	0.981
6 00	20.5	0.373	14 00	233.8	0.973	22 00	178.1	0.248	30 00	51.7	0.998
6 40	4.6	0.272	14 40	232.1	0.995	22 40	144.4	0.200	30 40	50.1	0.997
7 20	335.1	0.206	15 20	230.6	0.999	23 20	108.6	0.235			

FOR 0^h UNIVERSAL TIME

Date	$P-P_0$	$\frac{a(p)}{\rho}$	Date	$P-P_0$	$\frac{a(p)}{\rho}$	Date	$P-P_0$	$\frac{a(p)}{\rho}$	Date	$P-P_0$	$\frac{a(p)}{\rho}$
	°	"		°	"		°	"		°	"
Oct. 24	+1.8	63.8	Nov. 5	+1.1	66.2	Nov. 17	+0.2	65.5	Nov. 29	-0.4	61.5
25	1.8	64.1	6	1.0	66.3	18	0.1	65.3	30	0.4	61.0
26	1.7	64.3	7	0.9	66.3	19	+0.1	65.0	Dec. 1	0.5	60.6
27	1.7	64.6	8	0.8	66.4	20	0.0	64.8	2	0.5	60.1
28	1.6	64.9	9	0.7	66.4	21	0.0	64.5	3	0.5	59.6
29	+1.5	65.1	10	+0.7	66.4	22	-0.1	64.2	4	-0.5	59.1
30	1.5	65.3	11	0.6	66.3	23	0.1	63.8	5	0.6	58.6
31	1.4	65.5	12	0.5	66.2	24	0.2	63.5	6	0.6	58.1
Nov. 1	1.3	65.7	13	0.5	66.1	25	0.2	63.1	7	0.6	57.6
2	1.3	65.9	14	0.4	66.0	26	0.3	62.7	8	0.6	57.1
3	+1.2	66.0	15	+0.3	65.9	27	-0.3	62.3	9	-0.7	56.5
4	+1.1	66.1	16	+0.3	65.7	28	-0.4	61.9	10	-0.7	56.0

Position angle of satellite $p = p^1 + (P - P_0)$ Apparent distance of satellite $s = F \frac{a(p)}{\rho}$



APPARENT ORBITS OF SATELLITES I-V OF JUPITER, ELONGATED IN THE RATIO OF THREE TO ONE IN THE DIRECTION OF THEIR MINOR AXES, AT DATE OF OPPOSITION, APRIL 17, 1958.

In the diagrams of the configurations of Jupiter's four brighter satellites, pages 417-437, Jupiter is represented by a light disk, $\bigcirc$, in the center of the page, and the relative positions of the satellites at the Universal time stated above the diagrams are indicated by dots. The designation of each satellite is shown by a numeral placed to the right or left of the dot, according as the motion of the satellite at the instant in question is toward the east or toward the west, the motion being always toward the numeral. In constructing the diagrams the latitudes of the satellites are always considered zero, except where two or more of them chance to be at nearly the same distance from the planet, when they are placed one above the other, according to their apparent latitudes. If, at the epoch of any configuration, a satellite is projected on the planet, a light disk $\bigcirc$ is placed at the left-hand side of the page; and if a satellite is invisible, either on account of being occulted by the planet, or of being eclipsed by its shadow, a dark disk $\bullet$ is placed at the right-hand side of the page. The annexed numeral indicates the satellite thus affected.

NAMES OF THE SATELLITES

MEAN SYNODIC PERIODS

		d	h	m	s	=	d
V		0	11	57	27.635	=	0.498 236 52
I	Io	1	18	28	35.946	=	1.769 860 49
II	Europa	3	13	17	53.736	=	3.554 094 17
III	Ganymede	7	03	59	35.856	=	7.166 387 22
IV	Callisto	16	18	05	06.916	=	16.753 552 27
VI							266.00
VII							276.67

SIDEREAL PERIODS

	d
X	254
XII	631
XI	692
VIII	739
IX	758

UNIVERSAL TIME

SATELLITE V, FOR EVERY TWENTIETH ELONGATION

Eastern Elongation					Western Elongation						
	d	h		d	h		d	h		d	h
Jan.	27	20.6	Apr.	27	12.4	Jan.	27	14.6	Apr.	27	06.5
Feb.	6	19.7	May	7	11.5	Feb.	6	13.7	May	7	05.6
	16	18.8		17	10.6		16	12.9		17	04.7
	26	17.9		27	09.8		26	12.0		27	03.8
Mar.	8	17.0	June	6	08.9	Mar.	8	11.1	June	6	02.9
	18	16.1		16	08.0		18	10.1		16	02.0
	28	15.2		26	07.2		28	09.2		26	01.2
Apr.	7	14.3	July	6	06.3	Apr.	7	08.3	July	6	00.3
	17	13.4		..	..		17	07.4		..	..

SUPERIOR GEOCENTRIC CONJUNCTION

SATELLITE I

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	0	12	13.7	Mar.	21	02	51.3	June	8	16	35.1	Aug.	27	08	10.3
	2	06	42.5		22	21	17.5		10	11	02.5		29	02	40.4
	4	01	11.3		24	15	43.6		12	05	30.0		30	21	10.3
	5	19	40.1		26	10	09.7		13	23	57.5	Sept.	1	15	40.4
	7	14	08.7		28	04	35.8		15	18	25.2		3	10	10.3
	9	08	37.3		29	23	01.8		17	12	52.8		5	04	40.4
	11	03	05.9		31	17	27.8		19	07	20.6		6	23	10.4
	12	21	34.4	Apr.	2	11	53.7		21	01	48.4		8	17	40.5
	14	16	02.9		4	06	19.7		22	20	16.3		10	12	10.6
	16	10	31.2		6	00	45.6		24	14	44.2		12	06	40.8
	18	04	59.6		7	19	11.6		26	09	12.3		14	01	10.9
	19	23	27.9		9	13	37.5		28	03	40.4		15	19	41.1
	21	17	56.1		11	08	03.4		29	22	08.6		17	14	11.3
	23	12	24.2		13	02	29.3	July	1	16	36.7		19	08	41.5
	25	06	52.3		14	20	55.2		3	11	05.1		21	03	11.7
	27	01	20.3		16	15	21.1		5	05	33.4		22	21	42.0
	28	19	48.3		18	09	47.0		7	00	01.9		..	..	..
	30	14	16.2		20	04	13.0		8	18	30.4	Nov.	22	02	54.3
Feb.	1	08	44.0		21	22	38.9		10	12	59.0		23	21	24.6
	3	03	11.8		23	17	04.9		12	07	27.6		25	15	54.8
	4	21	39.5		25	11	30.8		14	01	56.3		27	10	25.1
	6	16	07.1		27	05	56.8		15	20	25.0		29	04	55.3
	8	10	34.6		29	00	22.8		17	14	53.7		30	23	25.5
	10	05	02.1		30	18	48.9		19	09	22.7	Dec.	2	17	55.7
	11	23	29.6	May	2	13	15.0		21	03	51.6		4	12	25.8
	13	17	57.0		4	07	41.2		22	22	20.6		6	06	56.0
	15	12	24.3		6	02	07.3		24	16	49.7		8	01	26.0
	17	06	51.5		7	20	33.5		26	11	18.7		9	19	56.2
	19	01	18.7		9	14	59.8		28	05	47.9		11	14	26.2
	20	19	45.8		11	09	26.1		30	00	17.1		13	08	56.2
	22	14	12.8		13	03	52.5		31	18	46.4		15	03	26.2
	24	08	39.8		14	22	18.9	Aug.	2	13	15.6		16	21	56.2
	26	03	06.7		16	16	45.3		4	07	45.0		18	16	26.2
	27	21	33.6		18	11	11.8		6	02	14.4		20	10	56.1
Mar.	1	16	00.4		20	05	38.4		7	20	43.9		22	05	26.0
	3	10	27.1		22	00	05.1		9	15	13.3		23	23	55.8
	5	04	53.8		23	18	31.8		11	09	42.9		25	18	25.6
	6	23	20.4		25	12	58.6		13	04	12.4		27	12	55.4
	8	17	46.9		27	07	25.4		14	22	42.2		29	07	25.2
	10	12	13.4		29	01	52.3		16	17	11.7		31	01	54.9
	12	06	39.9		30	20	19.2		18	11	41.5		32	20	24.6
	14	01	06.2	June	1	14	46.3		20	06	11.1				
	15	19	32.6		3	09	13.4		22	00	41.0				
	17	13	58.8		5	03	40.6		23	19	10.7				
	19	08	25.1		6	22	07.9		25	13	40.6				

UNIVERSAL TIME OF SUPERIOR GEOCENTRIC CONJUNCTION

SATELLITE II

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	0	09	22.2	Mar.	23	02	00.6	June	12	16	30.7	Sept.	2	10	29.8
	3	22	42.1		26	15	09.6		16	05	43.8		5	23	52.0
	7	12	02.4		30	04	17.6		19	18	57.9		9	13	14.4
	11	01	21.4	Apr.	2	17	26.1		23	08	12.1		13	02	37.0
	14	14	40.8		6	06	33.6		26	21	27.2		16	15	59.7
	18	03	58.9		9	19	41.7		30	10	42.4		20	05	22.6
	21	17	17.4		13	08	48.9	July	3	23	58.5		..	..	...
	25	06	34.5		16	21	56.8		7	13	14.8	Nov.	23	06	31.3
	28	19	51.9		20	11	04.1		11	02	31.7		26	19	55.4
Feb.	1	09	08.0		24	00	12.0		14	15	49.0		30	09	19.3
	4	22	24.3		27	13	19.4		18	05	06.8	Dec.	3	22	43.2
	8	11	39.2	May	1	02	27.6		21	18	24.9		7	12	07.0
	12	00	54.4		4	15	35.4		25	07	43.5		11	01	30.7
	15	14	08.2		8	04	44.1		28	21	02.4		14	14	54.2
	19	03	22.3		11	17	52.6	Aug.	1	10	21.8		18	04	17.7
	22	16	34.9		15	07	01.9		4	23	41.5		21	17	41.1
	26	05	47.9		18	20	11.1		8	13	01.5		25	07	04.2
Mar.	1	18	59.4		22	09	21.2		12	02	21.8		28	20	27.0
	5	08	11.2		25	22	31.3		15	15	42.5		32	09	49.9
	8	21	21.8		29	11	42.4		19	05	03.4				
	12	10	32.5	June	2	00	53.5		22	18	24.6				
	15	23	42.0		5	14	05.5		26	07	45.9				
	19	12	51.8		9	03	17.6		29	21	07.8				

SATELLITE III

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	1	22	55.3	Mar.	21	16	06.2	June	8	05	06.8	Aug.	26	00	56.7
	9	03	00.3		28	19	27.5		15	08	45.4	Sept.	2	05	14.7
	16	07	01.8	Apr.	4	22	45.7		22	12	28.7		9	09	34.6
	23	11	00.0		12	02	02.4		29	16	17.0		16	13	56.2
	30	14	53.8		19	05	18.2	July	6	20	10.6		..	..	...
Feb.	6	18	43.7		26	08	34.5		14	00	05.9	Nov.	27	10	23.4
	13	22	28.4	May	3	11	52.8		21	04	05.7	Dec.	4	14	49.9
	21	02	08.4		10	15	13.0		28	08	09.1		11	19	14.8
	28	05	43.6		17	18	36.5	Aug.	4	12	16.0		18	23	35.7
Mar.	7	09	14.7		24	22	02.7		11	16	26.7		26	03	59.9
	14	12	42.8	June	1	01	32.9		18	20	40.1				

SATELLITE IV

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	10	10	28.8	Apr.	3	19	37.6	June	25	22	56.4	Sept.	17	21	09.6
	27	04	31.8		20	09	49.7	July	12	16	20.8		..	..	...
Feb.	12	21	39.8	May	7	00	06.5		29	10	36.3	Nov.	24	07	22.1
Mar.	1	13	50.4		23	14	52.9	Aug.	15	05	34.6	Dec.	11	03	51.7
	18	05	05.4	June	9	06	27.4	Sept.	1	01	08.1		28	00	05.8

FOR 0^h UNIVERSAL TIME

DIFFERENTIAL COORDINATES OF SATELLITE VI

Date	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$	Date	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$	Date	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$
	m s	'		m s	'		m s	'
Jan. 0	-0 37	-16.7	Apr. 10	-2 12	+38.3	July 19	+2 47	-15.6
4	0 57	14.9	14	1 53	38.2	23	2 38	17.3
8	1 16	12.9	18	1 34	37.8	27	2 28	18.8
12	1 35	10.6	22	1 13	37.1	31	2 15	20.1
16	1 53	8.1	26	0 52	36.1	Aug. 4	2 01	21.0
20	-2 10	- 5.5	30	-0 31	+34.8	8	+1 46	-21.7
24	2 26	- 2.7	May 4	-0 10	33.2	12	1 30	22.1
28	2 41	+ 0.3	8	+0 11	31.4	16	1 13	22.1
Feb. 1	2 55	3.3	12	0 32	29.3	20	0 55	21.7
5	3 07	6.3	16	0 52	27.0	24	0 36	21.1
9	-3 17	+ 9.3	20	+1 12	+24.5	28	+0 18	-20.1
13	3 25	12.3	24	1 30	21.9	Sept. 1	0 00	18.9
17	3 33	15.3	28	1 46	19.1	5	-0 18	17.4
21	3 39	18.2	June 1	2 01	16.3	9	0 35	15.7
25	3 42	21.0	5	2 15	13.4	13	0 52	13.8
Mar. 1	-3 44	+23.7	9	+2 28	+10.4	17	-1 07	-11.7
5	3 43	26.2	13	2 38	7.4	21	1 22	9.6
9	3 41	28.5	17	2 47	4.5	25	-1 35	- 7.3
13	3 36	30.6	21	2 54	+ 1.6	..	..	..
17	3 30	32.5	25	2 59	- 1.3	Dec. 12	-2 32	+27.8
21	-3 21	+34.2	29	+3 02	- 4.0	16	-2 27	+28.6
25	3 11	35.6	July 3	3 03	6.6	20	2 22	29.2
29	2 58	36.8	7	3 02	9.1	24	2 15	29.7
Apr. 2	2 44	37.6	11	2 59	11.4	28	2 08	30.0
6	-2 29	+38.1	15	+2 54	-13.6	32	-2 00	+30.2

DIFFERENTIAL COORDINATES OF SATELLITE VII

Date	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$
	m s	'		m s	'		m s	'
Jan. 0	-0 36	+ 9.0	Apr. 10	+2 47	-11.7	July 19	-3 20	- 7.4
4	-0 15	9.7	14	2 30	12.6	23	3 20	6.4
8	+0 07	10.2	18	2 12	13.3	27	3 18	5.4
12	0 30	10.5	22	1 52	14.0	31	3 15	4.3
16	0 52	10.7	26	1 32	14.6	Aug. 4	3 10	3.2
20	+1 15	+10.7	30	+1 10	-15.0	8	-3 04	- 2.1
24	1 37	10.5	May 4	0 49	15.4	12	2 56	- 0.9
28	1 57	10.1	8	0 27	15.7	16	2 47	+ 0.3
Feb. 1	2 17	9.6	12	+0 05	15.9	20	2 37	1.5
5	2 35	8.9	16	-0 16	16.0	24	2 25	2.8
9	+2 52	+ 8.0	20	-0 37	-15.9	28	-2 12	+ 4.0
13	3 07	7.0	24	0 57	15.9	Sept. 1	1 57	5.2
17	3 21	5.9	28	1 16	15.8	5	1 41	6.3
21	3 32	4.7	June 1	1 34	15.6	9	1 24	7.3
25	3 41	3.3	5	1 51	15.3	13	1 06	8.2
Mar. 1	+3 48	+ 1.9	9	-2 06	-14.9	17	-0 47	+ 9.0
5	3 53	+ 0.4	13	2 20	14.4	21	0 28	9.6
9	3 55	- 1.1	17	2 33	13.8	25	-0 09	+10.0
13	3 55	2.6	21	2 44	13.2	..	..	..
17	3 52	4.1	25	2 53	12.5	Dec. 12	+3 08	- 5.6
21	+3 46	- 5.6	29	-3 01	-11.8	16	+3 07	- 7.0
25	3 38	7.0	July 3	3 08	11.0	20	3 05	8.3
29	3 29	8.4	7	3 13	10.2	24	3 02	9.6
Apr. 2	3 17	9.6	11	3 17	9.3	28	2 59	10.9
6	+3 03	-10.7	15	-3 19	- 8.4	32	+2 55	-12.1

UNIVERSAL TIME

JANUARY

d	h	m		d	h	m		d	h	m		d	h	m	
0	5	47.0	II. Ec. D.	8	11	15.	I.*Sh. E.	16	8	08	III.*Oc. R.	24	7	19	I.*Sh. I.
	9	58.9	I.*Ec. D.		12	26	I. Tr. E.		8	12.8	I.*Ec. D.		8	33	I.*Tr. I.
	10	33	II.*Oc. R.		20	53.1	III. Ec. D.		8	13	II.*Sh. E.		9	30	I.*Sh. E.
	13	19	I. Oc. R.		23	23.6	III. Ec. R.		8	17	II.*Tr. I.		10	42	I.*Tr. E.
1	7	10	I. Sh. I.	9	1	53	III. Oc. D.		10	33	II.*Tr. E.	25	2	51.4	II. Ec. D.
	8	20	I.*Tr. I.		3	17	II. Sh. I.		11	36	I.*Oc. R.		4	33.8	I. Ec. D.
	9	21	I.*Sh. E.		4	08	III. Oc. R.	17	5	25	I. Sh. I.		5	16.5	II. Ec. R.
	10	30	I.*Tr. E.		5	40	II. Sh. E.		6	39	I.*Tr. I.		5	26	II. Oc. D.
	16	56.3	III. Ec. D.		5	42	II. Tr. I.		7	36	I.*Sh. E.		7	43	II.*Oc. R.
	19	27.5	III. Ec. R.		6	20.0	I. Ec. D.		8	49	I.*Tr. E.		7	57	I.*Oc. R.
	21	46	III. Oc. D.		7	59	II.*Tr. E.	18	0	15.7	II. Ec. D.	26	1	47	I. Sh. I.
2	0	05	III. Oc. R.		9	42	I.*Oc. R.		2	41.0	I. Ec. D.		3	01	I. Tr. I.
	0	44	II. Sh. I.	10	3	32	I. Sh. I.		2	41.1	II. Ec. R.		3	58	I. Sh. E.
	3	04	II. Tr. I.		4	44	I. Tr. I.		2	50	II. Oc. D.		5	10	I. Tr. E.
	3	08	II. Sh. E.		5	43	I. Sh. E.		5	08	II. Oc. R.		18	54	III. Sh. I.
	4	27.1	I. Ec. D.		6	54	I.*Tr. E.		6	04	I. Oc. R.		21	20	III. Sh. E.
	5	23	II. Tr. E.		21	40.0	II. Ec. D.		23	54	I. Sh. I.		21	39	II. Sh. I.
	7	48	I.*Oc. R.										23	02.0	I. Ec. D.
3	1	38	I. Sh. I.	11	0	05.8	II. Ec. R.	19	1	08	I. Tr. I.	27	0	00	III. Tr. I.
	2	49	I. Tr. I.		0	11	II. Oc. D.		2	05	I. Sh. E.		0	02	II. Sh. E.
	3	50	I. Sh. E.		0	48.2	I. Ec. D.		3	17	I. Tr. E.		0	06	II. Tr. I.
	4	59	I. Tr. E.		2	31	II. Oc. R.		14	56	III. Sh. I.		2	05	III. Tr. E.
	19	04.4	II. Ec. D.		4	11	I. Oc. R.		17	23	III. Sh. E.		2	21	II. Tr. E.
	21	30.5	II. Ec. R.		22	00	I. Sh. I.		19	07	II. Sh. I.		2	25	I. Oc. R.
	21	32	II. Oc. D.		23	13	I. Tr. I.		20	03	III. Tr. I.		20	15	I. Sh. I.
	22	55.3	I. Ec. D.	12	0	11	I. Sh. E.		21	09.2	I. Ec. D.		21	29	I. Tr. I.
	23	52	II. Oc. R.		1	23	I. Tr. E.		21	29	II. Sh. E.		22	26	I. Sh. E.
4	2	17	I. Oc. R.		10	59	III.*Sh. I.		21	34	II. Tr. I.		22	38	I. Tr. E.
	20	07	I. Sh. I.		13	27	III. Sh. E.		22	11	III. Tr. E.	28	16	09.7	II. Ec. D.
	21	18	I. Tr. I.		16	01	III. Tr. I.		23	50	II. Tr. E.		17	30.2	I. Ec. D.
	22	18	I. Sh. E.		16	34	II. Sh. I.	20	0	33	I. Oc. R.		18	34.7	II. Ec. R.
	23	28	I. Tr. E.		18	13	III. Tr. E.		18	22	I. Sh. I.		18	43	II. Oc. D.
5	7	00	III. Sh. I.		18	57	II. Sh. E.		19	36	I. Tr. I.		20	54	I. Oc. R.
	9	29	III.*Sh. E.		19	00	II. Tr. I.		20	33	I. Sh. E.		21	00	II. Oc. R.
	11	55	III.*Tr. I.		19	16.4	I. Ec. D.		21	45	I. Tr. E.				
	14	01	II. Sh. I.		21	16	II. Tr. E.	21	13	34.0	II. Ec. D.	29	14	44	I. Sh. I.
	14	10	III. Tr. E.		22	39	I. Oc. R.		15	37.4	I. Ec. D.		15	57	I. Tr. I.
	16	23	II. Tr. I.	13	16	29	I. Sh. I.		15	59.3	II. Ec. R.		16	55	I. Sh. E.
	16	24	II. Sh. E.		17	42	I. Tr. I.		16	08	II. Oc. D.		18	06	I. Tr. E.
	17	23.6	I. Ec. D.		18	40	I. Sh. E.		18	26	II. Oc. R.	30	8	45.1	III.*Ec. D.
	18	41	II. Tr. E.		19	52	I. Tr. E.		19	01	I. Oc. R.		10	56	II.*Sh. I.
	20	45	I. Oc. R.	14	10	58.3	II.*Ec. D.	22	12	50	I. Sh. I.		11	13.2	III.*Ec. R.
6	14	35	I. Sh. I.		13	23.8	II. Ec. R.		14	04	I. Tr. I.		11	58.3	I. Ec. D.
	15	47	I. Tr. I.		13	31	II. Oc. D.		15	01	I. Sh. E.		13	18	II. Sh. E.
	16	46	I. Sh. E.		13	44.6	I. Ec. D.		16	14	I. Tr. E.		13	22	II. Tr. I.
	17	57	I. Tr. E.		15	50	II. Oc. R.						13	51	III. Oc. D.
7	8	22.7	II.*Ec. D.		17	08	I. Oc. R.	23	4	47.7	III. Ec. D.		15	21	I. Oc. R.
	10	48.5	II.*Ec. R.	15	10	57	I.*Sh. I.		7	16.6	III.*Ec. R.		15	36	II. Tr. E.
	10	52	II.*Oc. D.		12	11	I. Tr. I.		8	23	II.*Sh. I.		15	57	III. Oc. R.
	11	51.8	I.*Ec. D.		13	08	I. Sh. E.		9	56	III.*Oc. D.	31	9	12	I.*Sh. I.
	13	12	II. Oc. R.		14	20	I. Tr. E.		10	05.6	I.*Ec. D.		10	25	I.*Tr. I.
	15	15	I. Oc. R.						10	46	II.*Sh. E.		11	23	I.*Sh. E.
8	9	04	I.*Sh. I.	16	0	50.1	III. Ec. D.		10	50	II.*Tr. I.		12	34	I. Tr. E.
	10	16	I.*Tr. I.		3	19.7	III. Ec. R.		12	04	III. Oc. R.				
					5	50	II. Sh. I.		13	06	II. Tr. E.				
					5	55	III. Oc. D.		13	29	I. Oc. R.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

JANUARY

Phases of the Eclipses of the Satellites

I			III		
W	*		E	W	
	d			d	r
II			IV		
W	*		E	W	No Eclipse 
	d	r			

Configurations at 10^h 30^m

Day	West			East		
0		.3	○	4.		.1 ● .2 ●
1	○ 1.		.3	○	4. 2.	
2			^{2.} 4.	○	.1 .3	
3		4.	.21.	○	.3	
4		4.		○	.1.2 3.	
5		4.	.1 3	○	.2.	
6		.4	3.2.	○	1.	
7		.4	.3	.1	○	.2 ●
8	○ 1.	.4	.3	○	2.	
9			.4	2.	○ .1 .3	
10			.2 1.	○ ^{4.}	.3	
11				○	.1 ^{2.} .43.	
12			1.	○ 3. 2.	.4	
13			^{2.} 3.	○	1.	.4
14		3.	.1.2	○		.4
15		.3	○ 1.	.2		4.
16	○ 2.		○ .3		4.	.1 ●
17		.2	1.	○	4. ^{3.}	
18				○	4. ^{2.} 3.	
19			^{1.} 4.	○	3. 2.	
20		4.	^{2.} 3.	○	1.	
21		4.	3.	^{2.} 1.	○	
22		4.	.3	○	1. .2	
23		.4		2	○	.1 ● .3 ●
24	○ 1.	.4	.2	○	.3	
25		.4		○ ^{2.} 1.	3.	
26			.4 1.	○	^{2.} 3.	
27			^{2.} 3.	○	.4 .1	
28		3.	^{2.} 1.	○	.4	
29		.3	○	1. .2	.4	
30			.1	○ 2.		.4 .3 ●
31	○ 1.	2.	○	.3	4.	

UNIVERSAL TIME

FEBRUARY

d	h	m		d	h	m		d	h	m		d	h	m	
1	5	27.2	II.*Ec. D.	9	5	34	I.*Sh. I.	17	7	39	II.*Sh. E.	26	1	01.5	I. Ec. D.
	6	26.5	I.*Ec. D.		6	45	I.*Tr. I.		7	56	I.*Oc. R.		2	33.1	II. Ec. D.
	7	52.0	II.*Ec. R.		7	45	I.*Sh. E.		9	11	III.*Sh. E.		4	11	I.*Oc. R.
	8	00	II.*Oc. D.		8	53	I.*Tr. E.		9	44	II.*Tr. E.		6	55	II.*Oc. R.
	9	49	I.*Oc. R.						11	27	III.*Tr. I.		22	18	I. Sh. I.
	10	16	II.*Oc. R.	10	2	45	II. Sh. I.		13	24	III. Tr. E.		23	18	I. Tr. I.
					2	47.5	I. Ec. D.	18	1	56	I. Sh. I.	27	0	29	I. Sh. E.
2	3	41	I. Sh. I.		5	05	III.*Tr. I.		3	02	I. Tr. I.		1	27	I. Tr. E.
	4	53	I. Tr. I.		5	06	II.*Sh. E.		4	07	I. Sh. E.		19	29.8	I. Ec. D.
	5	51	I.*Sh. E.		5	13	III.*Sh. E.		5	11	I.*Tr. E.		21	06	II. Sh. I.
	7	02	I.*Tr. E.		6	07	I.*Oc. R.		23	08.6	I. Ec. D.		22	38	I. Oc. R.
	22	51	III. Sh. I.		7	18	II.*Tr. E.		23	57.2	II. Ec. D.		23	06	II. Tr. I.
3	0	12	II. Sh. I.		7	42	III.*Tr. I.	19	2	23	I. Oc. R.		23	28	II. Sh. E.
	0	54.7	I. Ec. D.		9	42	III.*Tr. E.		4	30	II.*Oc. R.	28	0	34.3	III. Ec. D.
	1	16	III. Sh. E.						20	24	I. Sh. I.		1	18	II. Tr. E.
	2	34	II. Sh. E.	11	0	02	I. Sh. I.		21	29	I. Tr. I.		2	59.6	III. Ec. R.
	2	37	II. Tr. I.		1	12	I. Tr. I.		22	35	I. Sh. E.		4	46	III.*Oc. D.
	3	53	III. Tr. I.		2	13	I. Sh. E.		23	38	I. Tr. E.		6	41	III.*Oc. R.
	4	16	I. Oc. R.		3	21	I. Tr. E.						16	46	I. Sh. I.
	4	51	II. Tr. E.		21	15.6	I. Ec. D.	20	17	36.8	I. Ec. D.		17	45	I. Tr. I.
	5	55	III.*Tr. E.		21	21.3	II. Ec. D.		18	34	II. Sh. I.		18	57	I. Sh. E.
	22	09	I. Sh. I.		23	45.6	II. Ec. R.		20	37.6	III. Ec. D.		19	54	I. Tr. E.
	23	21	I. Tr. I.		23	47	II. Oc. D.		20	43	II. Tr. I.				
4	0	20	I. Sh. E.	12	0	34	I. Oc. R.		20	50	I. Oc. R.				
	1	30	I. Tr. E.		2	02	II. Oc. R.		20	55	II. Sh. E.				
	18	45.4	II. Ec. D.		18	31	I. Sh. I.		22	56	II. Tr. E.				
	19	23.0	II. Ec. D.		19	40	I. Tr. I.		23	03.3	III. Ec. R.				
	21	10.2	II. Ec. R.		20	42	I. Sh. E.								
	21	16	II. Oc. D.		21	49	I. Tr. E.	21	1	10	III. Oc. D.				
	22	44	I. Oc. R.						3	07	III. Oc. R.				
	23	32	II. Oc. R.	13	15	43.9	I. Ec. D.		14	52	I. Sh. I.				
					16	01	II. Sh. I.		15	57	I. Tr. I.				
5	16	37	I. Sh. I.		16	40.3	III. Ec. D.		17	03	I. Sh. E.				
	17	49	I. Tr. I.		18	18	II. Tr. I.		18	05	I. Tr. E.				
	18	48	I. Sh. E.		18	23	II. Sh. E.								
	19	58	I. Tr. E.		19	01	I. Oc. R.	22	12	05.0	I. Ec. D.				
					19	06.9	III. Ec. R.		13	14.7	II. Ec. D.				
6	12	43.0	III. Ec. D.		20	31	II. Tr. E.		15	17	I. Oc. R.				
	13	28	II. Sh. I.		21	28	III. Oc. D.		17	42	II. Oc. R.				
	13	51.2	I. Ec. D.		23	28	III. Oc. R.								
	15	10.4	III. Ec. R.					23	9	21	I.*Sh. I.				
	15	50	II. Sh. E.	14	12	59	I. Sh. I.		10	24	I.*Tr. I.				
	15	51	II. Tr. I.		14	07	I. Tr. I.		11	32	I. Sh. E.				
	17	12	I. Oc. R.		15	10	I. Sh. E.		12	33	I. Tr. E.				
	17	42	III. Oc. D.		16	16	I. Tr. E.								
	18	05	II. Tr. E.					24	6	33.3	I.*Ec. D.				
	19	45	III. Oc. R.	15	10	12.2	I.*Ec. D.		7	50	II.*Sh. I.				
					10	38.9	II.*Ec. D.		9	44	I.*Oc. R.				
7	11	06	I.*Sh. I.		13	29	I. Oc. R.		9	55	II.*Tr. I.				
	12	17	I. Tr. I.		15	16	II. Oc. R.		10	11	II.*Sh. E.				
	13	16	I. Sh. E.						10	44	III.*Sh. I.				
	14	26	I. Tr. E.	16	7	27	I.*Sh. I.		12	07	II. Tr. E.				
					8	35	I.*Tr. I.		13	08	III. Sh. E.				
8	8	03.0	II.*Ec. D.		9	38	I.*Sh. E.		15	07	III. Tr. I.				
	8	19.3	I.*Ec. D.		10	44	I.*Tr. E.		17	01	III. Tr. E.				
	10	27.5	II.*Ec. R.					25	3	49	I. Sh. I.				
	10	31	II.*Oc. D.	17	4	40.4	I.*Ec. D.		4	51	I.*Tr. I.				
	11	39	I. Oc. R.		5	17	II.*Sh. I.		6	00	I.*Sh. E.				
	12	47	II. Oc. R.		6	46	III.*Sh. I.		7	00	I.*Tr. E.				
					7	31	II.*Tr. I.								

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

FEBRUARY

Phases of the Eclipses of the Satellites

I				III				
W	[*] d		E	W	[*] d	[*] r		E
II				IV				
W	[*] d		E	W	No Eclipse			E

Configurations at 9^h 15^m

Day	West				East			
1				○	·3	4·	·1●·2●	
2			1·	○	² ₃	4·		
3			² ₃	○	·1	4·		
4		3·	² ₁	4○·				
5		·3	4·	○	1·2			
6		4·	³ ₁	○	2·			
7		4·	2·	○	1·	·3		
8		4·		○	·3		·1●·2●	
9		·4		1·○	2·3·			
10	○3·	·4		2·○	·1			
11		·4 ³	·21·	○				
12		·3	·4	○	² ₁			
13			·3·1	○	⁴ ₂			
14			2·	○	1·3	·4		
15			² ₁	○	·3	·4		
16	○1·			○	·23·		·4	
17	○2·			○ ¹ ₃		4·		
18			3·2	1·	○	4·		
19		·3		○	·2·1	4·		
20			·3·1	○	² ₄			
21			2·	4○	³ ₁			
22		4·	² ₁	○	·3			
23		4·		○1·	·2	·3·		
24		4·		2○·3·			·1●	
25		·4	² ₃	1·	○			
26		·4	3·	○	·2·1			
27		·4	·3	1·	○	2·		
28			·4	2·	○·3	1·		

UNIVERSAL TIME

MARCH

d	h	m		d	h	m		d	h	m		d	h	m	
1	13	58.0	I. Ec. D.	10	12	56	II. Sh. I.	18	10	11	I.*Tr. I.	27	8	03	I.*Sh. E.
	15	50.6	II. Ec. D.		13	18	I. Oc. R.		11	41	I. Sh. E.		8	32	I.*Tr. E.
	17	05	I. Oc. R.		14	36	II. Tr. I.		12	20	I. Tr. E.				
	20	06	II. Oc. R.		15	17	II. Sh. E.					28	3	02.5	I.*Ec. D.
					16	48	II. Tr. E.	19	6	40.8	I.*Ec. D.		5	40	I.*Oc. R.
2	11	14	I. Sh. I.		18	40	III. Sh. I.		9	29	I.*Oc. R.		7	19	II.*Sh. I.
	12	12	I. Tr. I.		21	02	III. Sh. E.		10	20.9	II.*Ec. D.		8	18	II.*Tr. I.
	13	26	I. Sh. E.		22	12	III. Tr. I.		13	58	II. Oc. R.		9	39	II.*Sh. E.
	14	21	I. Tr. E.										10	30	II. Tr. E.
				11	0	03	III. Tr. E.	20	3	58	I.*Sh. I.		16	25.6	III. Ec. D.
3	8	26.2	I.*Ec. D.		7	36	I.*Sh. I.		4	38	I.*Tr. I.		20	24	III. Oc. R.
	10	23	II.*Sh. I.		8	25	I.*Tr. I.		6	10	I.*Sh. E.				
	11	31	I. Oc. R.		9	47	I.*Sh. E.		6	47	I.*Tr. E.	29	0	21	I. Sh. I.
	12	17	II. Tr. I.		10	34	I.*Tr. E.						0	49	I. Tr. I.
	12	43	II. Sh. E.					21	1	09.1	I. Ec. D.		2	32	I.*Sh. E.
	14	29	II. Tr. E.						3	56	I.*Oc. R.		2	58	I.*Tr. E.
	14	42	III. Sh. I.	12	4	47.6	I.*Ec. D.		4	45	II.*Sh. I.		21	30.8	I. Ec. D.
	17	05	III. Sh. E.		7	44.9	I.*Oc. R.		6	02	II.*Tr. I.				
	18	42	III. Tr. I.		11	39	II. Oc. R.		7	05	II.*Sh. E.	30	0	06	I. Oc. R.
	20	34	III. Tr. E.						8	14	II.*Tr. E.		2	14.5	II.*Ec. D.
4	5	43	I.*Sh. I.	13	2	05	I. Sh. I.		12	27.2	III. Ec. D.		5	24	II.*Oc. R.
	6	39	I.*Tr. I.		2	52	I.*Tr. I.		14	51.0	III. Ec. R.		18	49	I. Sh. I.
	7	54	I.*Sh. E.		4	16	I.*Sh. E.		15	10	III. Oc. D.		19	15	I. Tr. I.
	8	47	I.*Tr. E.		5	01	I.*Tr. E.		17	03	III. Oc. R.		21	00	I. Sh. E.
					23	15.9	I. Ec. D.		22	27	I. Sh. I.		21	24	I. Tr. E.
									23	04	I. Tr. I.				
5	2	54.5	I. Ec. D.	14	2	11	I. Oc. R.					31	15	59.1	I. Ec. D.
	5	09.0	II.*Ec. D.		2	12	II. Sh. I.		22	0	38		18	32	I. Oc. R.
	5	58	I.*Oc. R.		3	45	II.*Tr. I.			1	13		20	35	II. Sh. I.
	9	18	II.*Oc. R.		4	33	II.*Sh. E.			19	37.4		21	26	II. Tr. I.
					5	57	II.*Tr. E.			22	22		22	56	II. Sh. E.
6	0	11	I. Sh. I.		8	29.4	III.*Ec. D.			23	38.5		23	38	II. Tr. E.
	1	05	I. Tr. I.		10	53.4	III. Ec. R.								
	2	22	I. Sh. E.		11	46	III. Oc. D.	23	3	07	II.*Oc. R.				
	3	14	I. Tr. E.		13	39	III. Oc. R.		16	55	I. Sh. I.				
	21	22.8	I. Ec. D.		20	33	I. Sh. I.		17	30	I. Tr. I.				
	23	39	II. Sh. I.		21	18	I. Tr. I.		19	06	I. Sh. E.				
					22	44	I. Sh. E.		19	39	I. Tr. E.				
7	0	25	I. Oc. R.		23	27	I. Tr. E.								
	1	27	II. Tr. I.					24	14	05.7	I. Ec. D.				
	2	00	II. Sh. E.						16	48	I. Oc. R.				
	3	38	II.*Tr. E.	15	17	44.2	I. Ec. D.		18	02	II. Sh. I.				
	4	31.5	III.*Ec. D.		20	37	I. Oc. R.		19	10	II. Tr. I.				
	6	56.0	III.*Ec. R.		21	02.5	II. Ec. D.		20	23	II. Sh. E.				
	8	18	III.*Oc. D.						21	22	II. Tr. E.				
	10	12	III.*Oc. R.	16	0	49	II. Oc. R.								
	18	39	I. Sh. I.		15	02	I. Sh. I.								
	19	32	I. Tr. I.		15	45	I. Tr. I.	25	2	35	III.*Sh. I.				
	20	50	I. Sh. E.		17	13	I. Sh. E.		4	57	III.*Sh. E.				
	21	41	I. Tr. E.		17	54	I. Tr. E.		5	00	III.*Tr. I.				
									6	50	III.*Tr. E.				
8	15	51.0	I. Ec. D.	17	12	12.5	I. Ec. D.		11	24	I. Sh. I.				
	18	26.5	II. Ec. D.		15	03	I. Oc. R.		11	56	I. Tr. I.				
	18	51	I. Oc. R.		15	29	II. Sh. I.		13	35	I. Sh. E.				
	22	28	II. Oc. R.		16	54	II. Tr. I.		14	05	I. Tr. E.				
					17	50	II. Sh. E.								
					19	06	II. Tr. E.	26	8	34.1	I.*Ec. D.				
9	13	08	I. Sh. I.		22	37	III. Sh. I.		11	14	I. Oc. R.				
	13	59	I. Tr. I.						12	56.9	II. Ec. D.				
	15	18	I. Sh. E.	18	0	59	III. Sh. E.		16	16	II. Oc. R.				
	16	08	I. Tr. E.		1	37	III. Tr. I.								
					3	28	III.*Tr. E.	27	5	52	I.*Sh. I.				
10	10	19.3	I.*Ec. D.		9	30	I.*Sh. I.		6	22	I.*Tr. I.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

APRIL

d	h	m		d	h	m		d	h	m		d	h	m	
1	6	33	III.*Sh. I.	10	9	40	I.*Sh. I.	19	6	01	I.*Tr. I.	28	4	20	I.*Tr. E.
	8	19	III.*Tr. I.		9	51	I.*Tr. I.		6	03	I.*Sh. I.		4	37	I.*Sh. E.
	8	54	III.*Sh. E.		11	51	I. Sh. E.		6	39.8	III.*Ec. R.		23	18	I. Oc. D.
	10	10	III.*Tr. E.		12	00	I. Tr. E.		8	10	I.*Tr. E.				
	13	18	I. Sh. I.						8	14	I.*Sh. E.	29	1	44.8	I.*Ec. R.
	13	41	I. Tr. I.	11	6	49.5	I.*Ec. D.	20	3	08	I.*Oc. D.		6	20	II.*Tr. I.
	15	29	I. Sh. E.		9	08	I.*Oc. R.		5	22.4	I.*Ec. R.		6	52	II.*Sh. I.
	15	50	I. Tr. E.		12	26	II. Sh. I.		9	57	II. Oc. D.		8	35	II.*Tr. E.
					12	46	II. Tr. I.		12	24.1	II. Ec. R.		9	12	II.*Sh. E.
2	10	27.5	I. Ec. D.		14	47	II. Sh. E.	21	0	27	I.*Tr. I.		20	37	I. Tr. I.
	12	58	I. Oc. R.		14	59	II. Tr. E.		0	31	I.*Sh. I.		20	54	I. Sh. I.
	15	32.9	II. Ec. D.						0	36	I.*Tr. E.		21	23	III. Tr. I.
	18	33	II. Oc. R.	12	0	21.4	III. Ec. D.		2	36	I.*Tr. E.		22	27	III. Sh. I.
					3	00	III.*Oc. R.		2	42	I.*Sh. E.		22	47	I. Tr. E.
3	7	46	I.*Sh. I.		4	09	I.*Sh. I.		21	34	I. Oc. D.		23	05	I. Sh. E.
	8	07	I.*Tr. I.		4	17	I.*Tr. I.		23	50.8	I. Ec. R.		23	24	III. Tr. E.
	9	57	I.*Sh. E.		6	20	I.*Sh. E.	22	4	06	II.*Tr. I.	30	0	46	III.*Sh. E.
	10	16	I.*Tr. E.		6	26	I.*Tr. E.		4	17	II.*Sh. I.		17	44	I. Oc. D.
									6	20	II.*Tr. E.		20	13.4	I. Ec. R.
4	4	55.9	I.*Ec. D.	13	1	17.9	I.*Ec. D.		6	38	II.*Sh. E.				
	7	24	I.*Oc. R.		3	34	I.*Oc. R.		18	08	III. Tr. I.				
	9	52	II.*Sh. I.		7	26.6	II.*Ec. D.		18	29	III. Sh. I.				
	10	32	II. Tr. I.		9	56	II.*Oc. R.		18	53	I. Tr. I.				
	12	13	II. Sh. E.		22	37	I. Sh. I.		19	00	I. Sh. I.				
	12	45	II. Tr. E.		22	43	I. Tr. I.		20	05	III. Tr. E.				
	20	23.5	III. Ec. D.						20	48	III. Sh. E.				
	23	42	III. Oc. R.	14	0	48	I.*Sh. E.		21	02	I. Tr. E.				
					0	52	I.*Tr. E.		21	11	I. Sh. E.				
5	2	15	I.*Sh. I.		19	46.4	I. Ec. D.	23	16	00	I. Oc. D.				
	2	33	I.*Tr. I.		22	00	I. Oc. R.		18	19.4	I. Ec. R.				
	4	26	I.*Sh. E.						23	04	II. Oc. D.				
	4	42	I.*Tr. E.	15	1	43	II.*Sh. I.								
	23	24.3	I. Ec. D.		1	52	II.*Tr. I.								
					4	04	II.*Sh. E.								
6	1	50	I.*Oc. R.		4	06	II.*Tr. E.	24	1	42.2	II.*Ec. R.				
	4	50.5	II.*Ec. D.		14	30	III. Sh. I.		13	19	I. Tr. I.				
	7	40	II.*Oc. R.		14	52	III. Tr. I.		13	29	I. Sh. I.				
	20	43	I. Sh. I.		16	47	III. Tr. E.		15	28	I. Tr. E.				
	20	59	I. Tr. I.		16	50	III. Sh. E.		15	40	I. Sh. E.				
	22	54	I. Sh. E.		17	06	I. Sh. I.								
	23	08	I. Tr. E.		17	09	I. Tr. I.	25	10	26	I. Oc. D.				
					19	17	I. Sh. E.		12	47.8	I. Ec. R.				
7	17	52.7	I. Ec. D.		19	18	I. Tr. E.		17	13	II. Tr. I.				
	20	16	I. Oc. R.						17	34	II. Sh. I.				
	23	09	II. Sh. I.	16	14	14.8	I. Ec. D.		19	28	II. Tr. E.				
	23	39	II. Tr. I.		16	26	I. Oc. R.		19	55	II. Sh. E.				
					20	44.9	II. Ec. D.								
8	1	30	II.*Sh. E.		23	06.5	II. Ec. R.	26	7	35	III.*Oc. D.				
	1	52	II.*Tr. E.						7	45	I.*Tr. I.				
	10	32	III. Sh. I.	17	11	34	I. Sh. I.		7	57	I.*Sh. I.				
	11	37	III. Tr. I.		11	35	I. Tr. I.		9	54	I. Tr. E.				
	12	52	III. Sh. E.		13	44	I. Tr. E.		10	08	I. Sh. E.				
	13	29	III. Tr. E.		13	45	I. Sh. E.		10	37.2	III. Ec. R.				
	15	12	I. Sh. I.												
	15	25	I. Tr. I.	18	8	42	I.*Oc. D.								
	17	23	I. Sh. E.		10	53.9	I. Ec. R.	27	4	52	I.*Oc. D.				
	17	34	I. Tr. E.		14	59	II. Tr. I.		7	16.4	I.*Ec. R.				
					15	00	II. Sh. I.		12	12	II. Oc. D.				
9	12	21.1	I. Ec. D.		17	13	II. Tr. E.		14	59.8	II. Ec. R.				
	14	42	I. Oc. R.		17	21	II. Sh. E.								
	18	08.9	II. Ec. D.					28	2	11	I.*Tr. I.				
	20	49	II. Oc. R.	19	4	19.2	III.*Ec. D.		2	26	I.*Sh. I.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

APRIL

Phases of the Eclipses of the Satellites

I			III		
W		E	W		E
II			IV		
W		E	W No Eclipse		E

Configurations at 6^h 00^m

Day	West	East
1	•4	2• 3○• 1•
2		•4 3• •2 •1 ○
3		•3 •4 ○ 1• •2
4		•3 ○ 2••4 •1 ●
5		2• 1• ○ •3 •4
6		○ •1 •3 •4 •2 ●
7		1• ○ 2• 3• •4
8		2• ○ 3• 1• •4
9		3••2 •1 ○ •4
10	3•	○ 1• •2 •4
11		•3 •1○ 2• 4•
12	○ 1•	2• 4•○ •3
13		4• •○2 •1 •3
14	4•	1• ○ 2• 3•
15	4•	2•○ 3• ¹
16	•4	•2 •1 ○
17	•4 3•	○ 1• ²
18	•4 •3	•1 ○ 2•
19		•42• 1○ •3 ●
20		•2○ ⁴ 1 •3
21		1• ○ •4 •2 3•
22	○ 2•	○ 1• ³ •4
23		•2 3• ¹ ○ •4
24	3•	○ 2• ¹ •4
25	•3	•1 ○ 2• •4
26		2• ○ 3• ¹ •4
27		•2 ○ •3 4• •1 ●
28		1• ○ 4• •2 3•
29		4• 2○• •1 3•
30	4•	•2 1• ³ ○

UNIVERSAL TIME

MAY

d	h	m		d	h	m		d	h	m		d	h	m	
1	1	20	II.*Oc. D.	10	1	04	II.*Sh. E.	18	22	46.9	II. Ec. R.	27	17	47	II. Tr. E.
	4	17.9	II.*Ec. R.		11	14	I. Tr. I.						19	31	II. Sh. E.
	15	03	I. Tr. I.		11	46	I. Sh. I.	19	7	27	I.*Tr. I.				
	15	23	I. Sh. I.		13	24	I. Tr. E.		8	09	I. Sh. I.	28	3	41	I.*Tr. I.
	17	13	I. Tr. E.		13	57	I. Sh. E.		9	37	I. Tr. E.		4	33	I.*Sh. I.
	17	34	I. Sh. E.		14	10	III. Oc. D.		10	20	I. Sh. E.		5	51	I.*Tr. E.
					18	33.8	III. Ec. R.						6	43	I.*Sh. E.
2	12	10	I. Oc. D.					20	4	33	I.*Oc. D.		10	51	III. Tr. I.
	14	41.9	I. Ec. R.		8	21	I.*Oc. D.		7	27.7	I.*Ec. R.		13	03	III. Tr. E.
	19	27	II. Tr. I.		11	04.7	I. Ec. R.		13	09	II. Tr. I.		14	23	III. Sh. I.
	20	09	II. Sh. I.		16	45	II. Oc. D.		14	37	II. Sh. I.		16	39	III. Sh. E.
	21	43	II. Tr. E.		20	11.2	II. Ec. R.		15	27	II. Tr. E.				
	22	29	II. Sh. E.						16	57	II. Sh. E.	29	0	47	I. Oc. D.
3	9	29	I. Tr. I.	12	5	41	I.*Tr. I.	21	1	53	I.*Tr. I.		3	51.0	I.*Ec. R.
	9	52	I. Sh. I.		6	15	I.*Sh. I.		2	38	I.*Sh. I.		10	32	II. Oc. D.
	10	51	III. Oc. D.		7	51	I.*Tr. E.		4	03	I.*Tr. E.		14	40.5	II. Ec. R.
	11	39	I. Tr. E.		8	25	I.*Sh. E.		4	48	I.*Sh. E.		22	08	I. Tr. I.
	12	02	I. Sh. E.						7	23	III.*Tr. I.		23	01	I. Sh. I.
	14	35.6	III. Ec. R.	13	2	48	I.*Oc. D.		9	33	III. Tr. E.	30	0	18	I. Tr. E.
4	6	36	I.*Oc. D.		5	33.3	I.*Ec. R.		10	23	III. Sh. I.		1	11	I.*Sh. E.
	9	10.5	I. Ec. R.		10	51	II. Tr. I.		12	40	III. Sh. E.		19	14	I. Oc. D.
	14	28	II. Oc. D.		12	02	II. Sh. I.		23	00	I. Oc. D.		22	19.6	I. Ec. R.
	17	35.5	II. Ec. R.		13	08	II. Tr. E.	22	1	56.4	I.*Ec. R.	31	4	39	II.*Tr. I.
5	3	56	I.*Tr. I.		14	21	II. Sh. E.		8	12	II. Oc. D.		6	30	II.*Sh. I.
	4	20	I.*Sh. I.	14	0	06	I. Tr. I.		12	04.9	II. Ec. R.		6	58	II.*Tr. E.
	6	05	I.*Tr. E.		0	43	I.*Sh. I.		20	20	I. Tr. I.		8	49	II. Sh. E.
	6	31	I.*Sh. E.		2	17	I.*Tr. E.		21	07	I. Sh. I.		16	35	I. Tr. I.
6	1	03	I.*Oc. D.		2	54	I.*Sh. E.		22	30	I. Tr. E.		17	30	I. Sh. I.
	3	39.0	I.*Ec. R.		4	00	III.*Tr. I.		23	17	I. Sh. E.		18	45	I. Tr. E.
	8	35	II.*Tr. I.		6	07	III.*Tr. E.						19	40	I. Sh. E.
	9	27	II. Sh. I.		6	24	III.*Sh. I.	23	17	27	I. Oc. D.				
	10	51	II. Tr. E.		8	42	III. Sh. E.		20	25.0	I. Ec. R.				
	11	46	II. Sh. E.		21	14	I. Oc. D.	24	2	19	II.*Tr. I.				
	22	22	I. Tr. I.	15	0	01.9	I. Ec. R.		3	54	II.*Sh. I.				
	22	49	I. Sh. I.		5	53	II.*Oc. D.		4	37	II.*Tr. E.				
7	0	31	I. Tr. E.		9	29.3	II. Ec. R.		6	14	II.*Sh. E.				
	0	41	III.*Tr. I.		18	34	I. Tr. I.		14	47	I. Tr. I.				
	0	59	I.*Sh. E.		19	12	I. Sh. I.		15	35	I. Sh. I.				
	2	26	III.*Sh. I.		20	44	I. Tr. E.		16	57	I. Tr. E.				
	2	44	III.*Tr. E.		21	22	I. Sh. E.		17	45	I. Sh. E.				
	4	44	III.*Sh. E.	16	15	40	I. Oc. D.		20	56	III. Oc. D.				
	19	29	I. Oc. D.		18	30.5	I. Ec. R.		23	09	III. Oc. R.				
	22	07.6	I. Ec. R.		23	59	II. Tr. I.	25	0	13.1	III. Ec. D.				
8	3	36	II.*Oc. D.	17	1	19	II.*Sh. I.		2	30.9	III.*Ec. R.				
	6	53.6	II.*Ec. R.		2	17	II.*Tr. E.		11	53	I. Oc. D.				
	16	48	I. Tr. I.		3	38	II.*Sh. E.		14	53.7	I. Ec. R.				
	17	18	I. Sh. I.		13	00	I. Tr. I.		21	22	II. Oc. D.				
	18	58	I. Tr. E.		13	41	I. Sh. I.	26	1	22.6	II.*Ec. R.				
	19	28	I. Sh. E.		15	10	I. Tr. E.		9	14	I. Tr. I.				
9	13	55	I. Oc. D.		15	51	I. Sh. E.		10	04	I. Sh. I.				
	16	36.1	I. Ec. R.		17	32	III. Oc. D.		11	24	I. Tr. E.				
	21	43	II. Tr. I.		19	41	III. Oc. R.		12	14	I. Sh. E.				
	22	44	II. Sh. I.		20	14.2	III. Ec. D.	27	6	20	I.*Oc. D.				
	23	59	II. Tr. E.		22	32.6	III. Ec. R.		9	22.3	I. Ec. R.				
				18	10	07	I. Oc. D.		15	29	II. Tr. I.				
					12	59.2	I. Ec. R.		17	12	II. Sh. I.				
					19	02	II. Oc. D.								

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

MAY

Phases of the Eclipses of the Satellites

I		E	III		E	
W			W			
II		E	IV	No Eclipse		E
W			W			

Configurations at 5^h 00^m

Day	West	East
1	4. 3.	○ ·2 ·1
2	4. ·3 ·1	○ 2.
3	·4 2. ·3	○ 1.
4	·4 ·2 ·1	○ ·3
5	○1. ·4	○ ·2 ·3
6	·4	○ ¹ / ₂ 3.
7	2. 1. 3.	○ ·4
8	3.	○ ·1 ·4
9	·3 ·1	○ 2. ·4
10	³ / ₂ ○ 1.	·4
11	·2 ·1	·3 4.
12	1 ○ ·2	·3 4.
13	○ 2. 3. 4.	·1 ●
14	○3. 2. 1. ○ 4.	
15	3. ⁴ / ₄ ○ ² / ₄ ·1	
16	·3 4. 1. ○ 2.	
17	4. ·3 2. ○ 1.	
18	4. ·2 ·1 ○ ·3	
19	4. ○ 1. ·2 ·3	
20	·4 ○ 2. 3.	·1 ●
21	·4 2. 1. ○3.	
22	·4 3. ·2 ○ ·1	
23	·3 1. ·4 ○ ·2	
24	³ / ₂ ○ ⁴ / ₁	
25	·2 ·1 ○ ·3 ·4	
26	○ 1. ² / ₂ ·3 ·4	
27	·1 ○ 2. 3. ·4	
28	○1. 2. ○ 3. 4.	
29	3. ·2 ○ ·1 4.	
30	3. 1. ○ ·2 4.	
31	○2. ·3 ○ ¹ / ₄	

UNIVERSAL TIME

JUNE

d	h	m		d	h	m		d	h	m		d	h	m	
1	0	25	III. Oc. D.	9	15	00	I. Tr. E.	18	10	17	I. Sh. I.	26	11	30.5	I. Ec. R.
	2	41	III.*Oc. R.		16	03	I. Sh. E.		11	19	I. Tr. E.		20	16	II. Oc. D.
	4	11.7	III.*Ec. D.						12	26	I. Sh. E.		22	39	II. Oc. R.
	6	29.0	III.*Ec. R.	10	9	57	I. Oc. D.		21	37	III. Tr. I.		22	43.3	II. Ec. D.
	13	41	I. Oc. D.		13	11.8	I. Ec. R.		23	58	III. Tr. E.				
	16	48.3	I. Ec. R.		20	15	II. Tr. I.	19	2	20	III.*Sh. I.	27	1	02.1	II. Ec. R.
	23	43	II. Oc. D.		22	24	II. Sh. I.		4	34	III.*Sh. E.		5	28	I. Tr. I.
					22	35	II. Tr. E.		6	15	I. Oc. D.		6	41	I. Sh. I.
2	3	58.2	II.*Ec. R.						9	35.5	I. Ec. R.		7	38	I. Tr. E.
	11	02	I. Tr. I.	11	0	42	II. Sh. E.		17	47	II. Oc. D.		8	50	I. Sh. E.
	11	59	I. Sh. I.		7	17	I. Tr. I.		22	26.8	II. Ec. R.	28	2	35	I.*Oc. D.
	13	12	I. Tr. E.		8	22	I. Sh. I.						5	59.2	I. Ec. R.
	14	09	I. Sh. E.		9	27	I. Tr. E.	20	3	37	I.*Tr. I.		14	26	II. Tr. I.
					10	32	I. Sh. E.		4	46	I.*Sh. I.		16	47	II. Tr. E.
3	8	08	I. Oc. D.		17	57	III. Tr. I.		5	46	I.*Tr. E.		16	55	II. Sh. I.
	11	17.0	I. Ec. R.		20	16	III. Tr. E.		6	55	I. Sh. E.		19	13	II. Sh. E.
	17	51	II. Tr. I.		22	20	III. Sh. I.						23	57	I. Tr. I.
	19	48	II. Sh. I.	12	0	36	III. Sh. E.	21	0	43	I. Oc. D.	29	1	09	I.*Sh. I.
	20	10	II. Tr. E.		4	25	I.*Oc. D.		4	04.2	I.*Ec. R.		2	06	I.*Tr. E.
	22	07	II. Sh. E.		7	40.5	I. Ec. R.		11	55	II. Tr. I.		3	18	I.*Sh. E.
4	5	29	I.*Tr. I.		15	20	II. Oc. D.		14	17	II. Tr. E.		15	04	III. Oc. D.
	6	28	I.*Sh. I.		19	51.5	II. Ec. R.		14	18	II. Sh. I.		17	30	III. Oc. R.
	7	39	I. Tr. E.	13	1	46	I.*Tr. I.		16	36	II. Sh. E.		20	08.4	III. Ec. D.
	8	37	I. Sh. E.		2	51	I.*Sh. I.		22	04	I. Tr. I.		21	03	I. Oc. D.
	14	22	III. Tr. I.		3	56	I.*Tr. E.		23	15	I. Sh. I.		22	23.6	III. Ec. R.
	16	37	III. Tr. E.		5	00	I.*Sh. E.	22	0	14	I. Tr. E.	30	0	28.0	I. Ec. R.
	18	22	III. Sh. E.		22	52	I. Oc. D.		1	24	I.*Sh. E.		9	31	II. Oc. D.
	20	37	III. Sh. E.						11	17	III. Oc. D.		11	54	II. Oc. R.
5	2	35	I.*Oc. D.	14	2	09.2	I.*Ec. R.		13	39	III. Oc. R.		12	01.0	II. Ec. D.
	5	45.7	I.*Ec. R.		9	26	II. Tr. I.		16	08.9	III. Ec. D.		14	19.6	II. Ec. R.
	12	54	II. Oc. D.		11	42	II. Sh. I.		18	24.6	III. Ec. R.		18	25	I. Tr. I.
	17	16.1	II. Ec. R.		11	47	II. Tr. E.		19	11	I. Oc. D.		19	38	I. Sh. I.
	23	56	I. Tr. I.		14	00	II. Sh. E.		22	33.0	I. Ec. R.		20	35	I. Tr. E.
					20	13	I. Tr. I.	23	7	01	II. Oc. D.		21	47	I. Sh. E.
6	0	57	I. Sh. I.		21	20	I. Sh. I.		9	23	II. Oc. R.				
	2	06	I.*Tr. E.		22	23	I. Tr. E.		9	25.5	II. Ec. D.				
	3	06	I.*Sh. E.		23	29	I. Sh. E.		11	44.5	II. Ec. R.				
	21	02	I. Oc. D.						16	32	I. Tr. I.				
7	0	14.4	I. Ec. R.	15	7	34	III. Oc. D.		17	43	I. Sh. I.				
	7	02	II. Tr. I.		9	56	III. Oc. R.		18	42	I. Tr. E.				
	9	06	II. Sh. I.		12	09.3	III. Ec. D.		19	52	I. Sh. E.				
	9	22	II. Tr. E.		14	25.6	III. Ec. R.								
	11	24	II. Sh. E.		17	20	I. Oc. D.								
	18	23	I. Tr. I.		20	38.0	I. Ec. R.	24	13	39	I. Oc. D.				
	19	25	I. Sh. I.						17	01.6	I. Ec. R.				
	20	33	I. Tr. E.	16	4	33	II.*Oc. D.								
	21	35	I. Sh. E.		9	09.1	II. Ec. R.		25	1	10	II.*Tr. I.			
					14	41	I. Tr. I.			3	32	II.*Tr. E.			
8	3	57	III.*Oc. D.		15	48	I. Sh. I.			3	37	II.*Sh. I.			
	6	16	III.*Oc. R.		16	51	I. Tr. E.			5	55	II. Sh. E.			
	8	10.4	III. Ec. D.		17	58	I. Sh. E.			11	00	I. Tr. I.			
	10	27.1	III. Ec. R.							12	12	I. Sh. I.			
	15	30	I. Oc. D.	17	11	47	I. Oc. D.			13	10	I. Tr. E.			
	18	43.1	I. Ec. R.		15	06.7	I. Ec. R.			14	21	I. Sh. E.			
					22	41	II. Tr. I.								
9	2	07	II.*Oc. D.	18	1	00	II. Sh. I.	26	1	21	III.*Tr. I.				
	6	33.7	II. Ec. R.		1	02	II. Tr. E.			3	44	III.*Tr. E.			
	12	50	I. Tr. I.		3	18	II.*Sh. E.			6	19	III. Sh. I.			
	13	54	I. Sh. I.		9	09	I. Tr. I.			8	07	I. Oc. D.			
										8	32	III. Sh. E.			

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

JULY

d	h	m		d	h	m		d	h	m		d	h	m	
1	15	31	I. Oc. D.	9	14	46	I. Tr. I.	17	15	29	III. Tr. E.	25	9	04.3	II. Ec. D.
	18	56.7	I. Ec. R.		16	02	I. Sh. I.		17	15.8	I. Ec. R.		11	22.2	II. Ec. R.
					16	57	I. Tr. E.		18	17	III. Sh. I.		13	05	I. Tr. I.
2	3	42	II.*Tr. I.		18	10	I. Sh. E.		20	29	III. Sh. E.		14	20	I. Sh. I.
	6	04	II. Tr. E.										15	15	I. Tr. E.
	6	13	II. Sh. I.	10	9	03	III. Tr. I.	18	3	55	II.*Oc. D.		16	29	I. Sh. E.
	8	31	II. Sh. E.		11	31	III. Tr. E.		6	19	II. Oc. R.				
	12	53	I. Tr. I.		11	53	I. Oc. D.		6	29.2	II. Ec. D.	26	10	13	I. Oc. D.
	14	07	I. Sh. I.		14	18	III. Sh. I.		8	47.3	II. Ec. R.		13	39.7	I. Ec. R.
	15	03	I. Tr. E.		15	20.6	I. Ec. R.		11	10	I. Tr. I.				
	16	16	I. Sh. E.		16	29	III. Sh. E.		12	25	I. Sh. I.	27	0	48	II. Tr. I.
									13	20	I. Tr. E.		3	11	II.*Tr. E.
3	5	10	III. Tr. I.	11	1	20	II.*Oc. D.		14	34	I. Sh. E.		3	22	II.*Sh. I.
	7	35	III. Tr. E.		3	43	II.*Oc. R.						5	40	II. Sh. E.
	9	59	I. Oc. D.		3	54.1	II.*Ec. D.	19	8	17	I. Oc. D.		7	34	I. Tr. I.
	10	18	III. Sh. I.		6	12.4	II. Ec. R.		11	44.5	I. Ec. R.		8	49	I. Sh. I.
	12	31	III. Sh. E.		9	15	I. Tr. I.		22	09	II. Tr. I.		9	44	I. Tr. E.
	13	25.5	I. Ec. R.		10	30	I. Sh. I.						10	57	I. Sh. E.
	22	47	II. Oc. D.		11	25	I. Tr. E.	20	0	32	II. Tr. E.				
					12	39	I. Sh. E.		0	45	II. Sh. I.	28	4	42	I. Oc. D.
4	1	10	II.*Oc. R.						3	03	II.*Sh. E.		6	53	III. Oc. D.
	1	18.7	II.*Ec. D.	12	6	22	I. Oc. D.		5	38	I. Tr. I.		8	08.5	I. Ec. R.
	3	37.3	II.*Ec. R.		9	49.3	I. Ec. R.		6	54	I. Sh. I.		9	25	III. Oc. R.
	7	21	I. Tr. I.		19	32	II. Tr. I.		7	49	I. Tr. E.		12	05.6	III. Ec. D.
	8	36	I. Sh. I.		21	55	II. Tr. E.		9	02	I. Sh. E.		14	19.1	III. Ec. R.
	9	31	I. Tr. E.		22	09	II. Sh. I.						19	50	II. Oc. D.
	10	44	I. Sh. E.					21	2	46	I.*Oc. D.		22	14	II. Oc. R.
				13	0	26	II. Sh. E.		2	51	III.*Oc. D.		22	21.8	II. Ec. D.
5	4	28	I.*Oc. D.		3	44	I.*Tr. I.		5	21	III. Oc. R.				
	7	54.3	I. Ec. R.		4	59	I. Sh. I.		6	13.4	I. Ec. R.	29	0	39.6	II. Ec. R.
	16	58	II. Tr. I.		5	54	I. Tr. E.		8	06.6	III. Ec. D.		2	03	I.*Tr. I.
	19	20	II. Tr. E.		7	08	I. Sh. E.		10	20.5	III. Ec. R.		3	17	I.*Sh. I.
	19	32	II. Sh. I.		22	51	III. Oc. D.		17	13	II. Oc. D.		4	13	I. Tr. E.
	21	49	II. Sh. E.						19	37	II. Oc. R.		5	26	I. Sh. E.
				14	0	50	I. Oc. D.		19	46.7	II. Ec. D.		23	11	I. Oc. D.
					1	21	III.*Oc. R.		22	04.8	II. Ec. R.				
6	1	50	I.*Tr. I.		4	07.6	III.*Ec. D.					30	2	37.3	I.*Ec. R.
	3	04	I.*Sh. I.		4	18.2	I. Ec. R.	22	0	07	I. Tr. I.		14	08	II. Tr. I.
	4	00	I.*Tr. E.		6	21.9	III. Ec. R.		1	22	I.*Sh. I.		16	32	II. Tr. E.
	5	13	I. Sh. E.		14	37	II. Oc. D.		2	17	I.*Tr. E.		16	41	II. Sh. I.
	18	56	III. Oc. D.		17	01	II. Oc. R.		3	31	I.*Sh. E.		18	59	II. Sh. E.
	21	24	III. Oc. R.		17	11.7	II. Ec. D.		21	15	I. Oc. D.		20	32	I. Tr. I.
	22	56	I. Oc. D.		19	29.8	II. Ec. R.						21	46	I. Sh. I.
					22	12	I. Tr. I.	23	0	42.1	I. Ec. R.		22	43	I. Tr. E.
7	0	08.3	III. Ec. D.		23	28	I. Sh. I.		11	28	II. Tr. I.		23	55	I. Sh. E.
	2	23.0	III.*Ec. R.						13	52	II. Tr. E.				
	2	23.1	I.*Ec. R.	15	0	22	I. Tr. E.		14	04	II. Sh. I.	31	17	40	I. Oc. D.
	12	03	II. Oc. D.		1	36	I.*Sh. E.		16	21	II. Sh. E.		21	06.1	I. Ec. R.
	14	27	II. Oc. R.		19	19	I. Oc. D.		18	36	I. Tr. I.		21	08	III. Tr. I.
	14	36.4	II. Ec. D.		22	46.9	I. Ec. R.		19	51	I. Sh. I.		23	37	III. Tr. E.
	16	54.8	II. Ec. R.						20	46	I. Tr. E.				
	20	18	I. Tr. I.						22	00	I. Sh. E.				
	21	33	I. Sh. I.	16	8	51	II. Tr. I.								
	22	28	I. Tr. E.		11	14	II. Tr. E.								
	23	42	I. Sh. E.		11	27	II. Sh. I.	24	15	44	I. Oc. D.				
					13	44	II. Sh. E.		17	03	III. Tr. I.				
8	17	24	I. Oc. D.		16	41	I. Tr. I.		19	10.9	I. Ec. R.				
	20	51.8	I. Ec. R.		17	56	I. Sh. I.		19	31	III. Tr. E.				
					18	51	I. Tr. E.		22	16	III. Sh. I.				
					20	05	I. Sh. E.								
9	6	16	II. Tr. I.												
	8	38	II. Tr. E.	17	13	01	III. Tr. I.	25	0	27	III. Sh. E.				
	8	50	II. Sh. I.		13	48	I. Oc. D.		6	31	II. Oc. D.				
	11	08	II. Sh. E.						8	55	II. Oc. R.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., Occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

JULY

Phases of the Eclipses of the Satellites

I				III			
W		*	E	W		* d	* r E
II				IV			
W		* d	* r E	W	No Eclipse		E

Configurations at 3^h 00^m

Day	West				East			
1			1.	○	2.	3.	4.	
2			2	○	1	3.	4.	
3			2.	1	○	3.	4.	
4			3.	4	○	1.		2 ●
5			3.	4.	1	○	2.	
6	○ 1.		4.	3	2.	○		
7		4.		2	○	1	3	
8		4.		1.	○	2	3	
9		4.			○	2.	1	3.
10		4.	2.	1	○	3.		
11		4	3.		○	1.		2 ●
12		3.	4	1	○	2.		
13		3	2.	1	○	4		
14			2.	○	3		4	1 ●
15			1.	○		2	3	4
16				○	2.	1	3.	4
17			2.	1.	○	3.		4.
18			3.	2	○	1.		4.
19			3.	1	○	2.		4.
20			3	2.	○	1.	4.	
21			2.	4	○			1 ● 3 ●
22			4.	1	○	2	3	
23			4.		○	1	2.	3.
24			4.	2.	1.	○	3.	
25			4.	3.	2	○	1	
26			4.	3.	1	○	2	
27	○ 2.		4.	3		○	1.	
28			4	2	3	1	○	
29	○ 1.			4	○	2	3	
30					○	1	2.	3
31			2.	1.	○	3.	4	

UNIVERSAL TIME

AUGUST

d	h	m		d	h	m		d	h	m		d	h	m		d	h	m		
1	2	15	III.*Sh. I.	8	18	09	I. Sh. I.	17	13	31	II. Sh. E.	26	6	15.9	III. Ec. R.					
	4	26	III. Sh. E.		19	09	I. Tr. E.		14	32	I. Sh. I.		6	34	II. Oc. D.					
	9	10	II. Oc. D.		20	18	I. Sh. E.		15	36	I. Tr. E.		9	54	I. Tr. I.					
	11	34	II. Oc. R.						16	41	I. Sh. E.		10	56	I. Sh. I.					
	11	39.2	II. Ec. D.		9	14	07	I. Oc. D.					10	57.7	II. Ec. R.					
	13	56.8	II. Ec. R.			17	30.0	I. Ec. R.		18	10	35	I. Oc. D.		12	04	I. Tr. E.			
	15	02	I. Tr. I.							13	54.1	I. Ec. R.		13	04	I. Sh. E.				
	16	15	I. Sh. I.		10	6	11	II. Tr. I.		19	24	III. Oc. D.								
	17	12	I. Tr. E.			8	34	II. Tr. E.			21	56	III. Oc. R.		27	7	04	I. Oc. D.		
	18	23	I. Sh. E.			8	37	II. Sh. I.						10	17.9	I. Ec. R.				
						10	54	II. Sh. E.		19	0	04.0	III. Ec. D.							
2	12	10	I. Oc. D.			11	28	I. Tr. I.			2	16.4	III. Ec. R.		28	1	03	II.*Tr. I.		
	15	34.9	I. Ec. R.			12	38	I. Sh. I.			3	52	II. Oc. D.			3	11	II. Sh. I.		
						13	38	I. Tr. E.			7	55	I. Tr. I.			3	27	II. Tr. E.		
3	3	28	II. Tr. I.			14	47	I. Sh. E.			8	23.3	II. Ec. R.			4	24	I. Tr. I.		
	5	52	II. Tr. E.								9	01	I. Sh. I.			5	24	I. Sh. I.		
	6	00	II. Sh. I.		11	8	37	I. Oc. D.			10	06	I. Tr. E.			5	28	II. Sh. E.		
	8	17	II. Sh. E.			11	58.9	I. Ec. R.			11	10	I. Sh. E.			6	34	I. Tr. E.		
	9	31	I. Tr. I.			15	11	III. Oc. D.								7	33	I. Sh. E.		
	10	43	I. Sh. I.			17	43	III. Oc. R.		20	5	05	I. Oc. D.		29	1	34	I. Oc. D.		
	11	41	I. Tr. E.			20	04.5	III. Ec. D.			8	22.8	I. Ec. R.			4	46.7	I. Ec. R.		
	12	52	I. Sh. E.			22	17.3	III. Ec. R.			22	17	II. Tr. I.			13	57	III. Tr. I.		
4	6	39	I. Oc. D.		12	1	10	II.*Oc. D.		21	0	33	II.*Sh. I.			16	28	III. Tr. E.		
	10	03.7	I. Ec. R.			5	48.8	II. Ec. R.			0	41	II.*Tr. E.			18	10	III. Sh. I.		
	11	00	III. Oc. D.			5	57	I. Tr. I.			2	25	I. Tr. I.			19	56	II. Oc. D.		
	13	32	III. Oc. R.			7	07	I. Sh. I.			2	50	II. Sh. E.			20	21	III. Sh. E.		
	16	04.7	III. Ec. D.			8	08	I. Tr. E.			3	30	I. Sh. I.			22	53	I. Tr. I.		
	18	17.8	III. Ec. R.			9	15	I. Sh. E.			4	35	I. Tr. E.			23	53	I. Sh. I.		
	22	30	II. Oc. D.								5	39	I. Sh. E.							
					13	3	06	I. Oc. D.			23	35	I. Oc. D.		30	0	14.8	II.*Ec. R.		
5	0	53	II.*Oc. R.			6	27.6	I. Ec. R.								1	04	I.*Tr. E.		
	0	56.6	II.*Ec. D.			19	32	II. Tr. I.		22	2	51.6	I. Ec. R.			2	02	I. Sh. E.		
	3	14.3	II. Ec. R.			21	56	II. Sh. I.			9	41	III. Tr. I.			20	04	I. Oc. D.		
	4	00	I. Tr. I.			21	56	II. Tr. E.			12	11	III. Tr. E.			23	15.4	I. Ec. R.		
	5	12	I. Sh. I.								14	11	III. Sh. I.							
	6	10	I. Tr. E.		14	0	13	II. Sh. E.			16	22	III. Sh. E.		31	14	26	II. Tr. I.		
	7	21	I. Sh. E.			0	27	I. Tr. I.			17	13	II. Oc. D.			16	29	II. Sh. I.		
						1	35	I.*Sh. I.			20	55	I. Tr. I.			16	50	II. Tr. E.		
6	1	09	I.*Oc. D.			2	37	I. Tr. E.			21	40.5	II. Ec. R.			17	23	I. Tr. I.		
	4	32.4	I. Ec. R.			3	44	I. Sh. E.			21	58	I. Sh. I.			18	21	I. Sh. I.		
	16	49	II. Tr. I.			21	36	I. Oc. D.			23	05	I. Tr. E.			18	46	II. Sh. E.		
	19	13	II. Tr. E.													19	33	I. Tr. E.		
	19	19	II. Sh. I.		15	0	56.5	I.*Ec. R.		23	0	07	I. Sh. E.			20	30	I. Sh. E.		
	21	36	II. Sh. E.			5	27	III. Tr. I.			18	05	I. Oc. D.							
	22	29	I. Tr. I.			7	56	III. Tr. E.			21	20.3	I. Ec. R.							
	23	41	I. Sh. I.			10	12	III. Sh. I.												
						12	23	III. Sh. E.		24	11	39	II. Tr. I.							
7	0	39	I. Tr. E.			14	31	II. Oc. D.			13	52	II. Sh. I.							
	1	49	I.*Sh. E.			18	56	I. Tr. I.			14	03	II. Tr. E.							
	19	38	I. Oc. D.			19	06.0	II. Ec. R.			15	24	I. Tr. I.							
	23	01.3	I. Ec. R.			20	04	I. Sh. I.			16	08	II. Sh. E.							
						21	07	I. Tr. E.			16	27	I. Sh. I.							
8	1	16	III.*Tr. I.			22	13	I. Sh. E.			17	35	I. Tr. E.							
	3	46	III. Tr. E.								18	36	I. Sh. E.							
	6	14	III. Sh. I.		16	16	06	I. Oc. D.		25	12	35	I. Oc. D.							
	8	25	III. Sh. E.			19	25.2	I. Ec. R.			15	49.2	I. Ec. R.							
	11	49	II. Oc. D.								23	40	III. Oc. D.							
	14	13	II. Oc. R.		17	8	54	II. Tr. I.												
	14	14.0	II. Ec. D.			11	14	II. Sh. I.												
	16	31.5	II. Ec. R.			11	18	II. Tr. E.		26	2	13	III. Oc. R.							
	16	59	I. Tr. I.			13	26	I. Tr. I.			4	03.9	III. Ec. D.							

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

AUGUST

Phases of the Eclipses of the Satellites

I				III				
W		* r	E	W		* d	* r	E
II				IV				
W		* r	E	W	No Eclipse			E

Configurations at 1^h 45^m

Day	West				East			
1			•2 3•	○	•1		•4	
2			3•	1•	○	•2	•4	
3			•3		○	•2• 1•	4•	
4			2•	•3 •1	○		4•	
5					○	1• •3 4•		•2 ●
6					○	4• 2• •3		•1 ●
7			2•	•4 •1•	○	3•		
8	○ 3•		4•	•2	○	•1		
9		4•	3•	1•	○	•2		
10		4•	•3		○	2• •1		
11		•4		2• •3 •1	○			
12		•4			○	1• •3		•2 ●
13		•4		•1	○	2• •3		
14	○ 1•		•4	2•	○	3•		
15			•2		○	•4 •3•		
16			3•	1•	○	•2 •4		
17			•3		○	•2• •1	•4	
18			•3 •2	•1	○		•4	
19				•2	○	1•	•4	•3 ●
20				•1	○	•2 •3	4•	
21				2•	○	1•	3• 4•	
22			•2		○	3•	4•	•1 ●
23			3•	1•	○	•2 •4•		
24			3•	4•	○	•1 •2		
25			4• •3 2• 1•		○			
26		4•		•2	○	1•		•3 ●
27		4•		•1	○	•2 •3		
28	○ 2•	•4			○	1•	3•	
29		•4		•2	○	3•		•1 ●
30		•4		3• 1•	○	•2		
31			3•	•4	○	•1 2•		

UNIVERSAL TIME

SEPTEMBER

d	h	m		d	h	m		d	h	m		d	h	m	
1	14	34	I. Oc. D.	6	22	04	I. Oc. D.	12	8	36.8	I. Ec. R.	17	16	02.9	I. Ec. R.
	17	44.3	I. Ec. R.						22	38	III. Tr. I.				
2	3	59	III. Oc. D.	7	1	10.6	I. Ec. R.	13	1	08	III. Tr. E.	18	9	27	II. Tr. I.
	6	31	III. Oc. R.		17	13	II. Tr. I.		1	25	II. Oc. D.		10	22	I. Tr. I.
	8	03.0	III. Ec. D.		19	06	II. Sh. I.		2	08	III. Sh. I.		11	03	II. Sh. I.
	9	18	II. Oc. D.		19	22	I. Tr. I.		2	52	I. Tr. I.		11	07	I. Sh. I.
	10	14.8	III. Ec. R.		19	37	II. Tr. E.		3	42	I. Sh. I.		11	50	II. Tr. E.
	11	53	I. Tr. I.		20	16	I. Sh. I.		4	18	III. Sh. E.		12	33	I. Tr. E.
	12	50	I. Sh. I.		21	23	II. Sh. E.		5	03	I. Tr. E.		13	16	I. Sh. E.
	13	32.0	II. Ec. R.		21	33	I. Tr. E.		5	23.3	II. Ec. R.		13	20	II. Sh. E.
	14	03	I. Tr. E.		22	25	I. Sh. E.		5	51	I. Sh. E.				
	14	59	I. Sh. E.	8	16	34	I. Oc. D.	14	0	05	I.*Oc. D.	19	7	35	I. Oc. D.
					19	39.3	I. Ec. R.		3	05.5	I. Ec. R.		10	31.6	I. Ec. R.
3	9	04	I. Oc. D.	9	8	19	III. Oc. D.		20	02	II. Tr. I.	20	3	00	III. Tr. I.
	12	13.0	I. Ec. R.		10	50	III. Oc. R.		21	22	I. Tr. I.		4	11	II. Oc. D.
4	3	50	II. Tr. I.		12	01.9	III. Ec. D.		21	44	II. Sh. I.		4	52	I. Tr. I.
	5	48	II. Sh. I.		12	03	II. Oc. D.		22	10	I. Sh. I.		5	30	III. Tr. E.
	6	14	II. Tr. E.		13	52	I. Tr. I.		22	26	II. Tr. E.		5	36	I. Sh. I.
	6	23	I. Tr. I.		14	13.4	III. Ec. R.		23	33	I. Tr. E.		6	07	III. Sh. I.
	7	19	I. Sh. I.		14	45	I. Sh. I.						7	03	I. Tr. E.
	8	05	II. Sh. E.		16	03	I. Tr. E.	15	0	01	II.*Sh. E.		7	45	I. Sh. E.
	8	33	I. Tr. E.		16	06.2	II. Ec. R.		0	19	I.*Sh. E.		7	57.3	II. Ec. R.
	9	27	I. Sh. E.		16	53	I. Sh. E.		18	35	I. Oc. D.		8	17	III. Sh. E.
									21	34.2	I. Ec. R.	21	2	06	I. Oc. D.
5	3	34	I. Oc. D.	10	11	05	I. Oc. D.	16	12	41	III. Oc. D.		5	00.4	I. Ec. R.
	6	41.8	I. Ec. R.		14	08.0	I. Ec. R.		14	48	II. Oc. D.		22	51	II. Tr. I.
	18	17	III. Tr. I.						15	12	III. Oc. R.		23	22	I. Tr. I.
	20	47	III. Tr. E.	11	6	38	II. Tr. I.		15	52	I. Tr. I.	22	0	05	I. Sh. I.
	22	09	III. Sh. I.		8	22	I. Tr. I.		16	00.6	III. Ec. D.		0	21	II. Sh. I.
	22	40	II. Oc. D.		8	25	II. Sh. I.		16	39	I. Sh. I.		1	15	II. Tr. E.
6	0	20	III.*Sh. E.		9	02	II. Tr. E.		18	03	I. Tr. E.		1	33	I. Tr. E.
	0	53	I.*Tr. I.		9	13	I. Sh. I.		18	11.9	III. Ec. R.		2	14	I. Sh. E.
	1	47	I. Sh. I.		10	33	I. Tr. E.		18	40.3	II. Ec. R.		2	38	II. Sh. E.
	2	49.1	II. Ec. R.		10	42	II. Sh. E.		18	48	I. Sh. E.		20	36	I. Oc. D.
	3	03	I. Tr. E.		11	22	I. Sh. E.						23	29.2	I. Ec. R.
	3	56	I. Sh. E.	12	5	35	I. Oc. D.	17	13	05	I. Oc. D.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

SEPTEMBER

Phases of the Eclipses of the Satellites

I				III			
W		* r	E	W		* d * r	E
II				IV			
W		* r	E	W No Eclipse			E

Configurations at 0^h 15^m

Day	West				East			
1		•3	2 ¹ •	○ ⁴				
2			•2 •3	○	•1 •4			
3			•1	○	•2 •3	•4		
4				○	2 ¹ •	•3	•4	
5		2•	•1	○	3•		•4	
6			3 ¹	○		4•		•2 ●
7		3•		○	2•	4•		•1 ●
8		•3	1 ¹ •	○		4•		
9			•2 •3	○	4 ¹ •			
10			1 ¹ •	○	•3			
11		4•		○	2 ¹ •	•3		
12		4•	2•	•1	○	3•		
13	○3•	4•		○	2 ¹ •			
14		•4	3•	○	2•			•1 ●
15		•4	•3	2 ¹ •	○			
16			•4	2 ³ •	○	•1		
17			•4	1•	○	•3		
18					○	•4 2 ¹ •	•3	
19			2•	•1	○	4 ¹ •		
20				•2	○	3• 1•	•4	
21			3•	•1	○	•2	•4	
22	○1• ○2•		•3	○			•4	
23				○				
24				○				
25				○				
26				○				
27				○				
28				○				
29				○				
30				○				

SATELLITES OF JUPITER, 1958
UNIVERSAL TIME

NOVEMBER

By reason of the proximity of JUPITER to the SUN the phenomena of the satellites are not given from September 23 to November 22.

d	h	m		d	h	m		d	h	m		d	h	m	
22	1	31.9	I. Ec. D.	24	17	10	I. Sh. I.	26	18	03.5	II. Ec. D.	29	3	25.9	I. Ec. D.
	4	00	I. Oc. R.		17	29	I. Tr. I.		21	05	II. Oc. R.		6	01	I. Oc. R.
	22	41	I. Sh. I.		19	19	I. Sh. E.								
	22	59	I. Tr. I.		19	39	I. Tr. E.	27	7	47.3	III. Ec. D.	30	0	35	I. Sh. I.
					23	51	II. Sh. I.		8	57.4	I. Ec. D.		0	59	I. Tr. I.
23	0	51	I. Sh. E.						11	30	I.*Oc. R.		2	44	I. Sh. E.
	1	09	I. Tr. E.	25	0	30	II. Tr. I.		11	33	III.*Oc. R.		3	09	I. Tr. E.
	4	46.5	II. Ec. D.		2	07	II. Sh. E.						7	20.5	II. Ec. D.
	7	41	II. Oc. R.		2	49	II. Tr. E.	28	6	07	I. Sh. I.		10	29	II. Oc. R.
	17	51	III. Sh. I.		14	28.9	I. Ec. D.		6	29	I. Tr. I.		21	49	III. Sh. I.
	19	02	III. Tr. I.		17	00	I. Oc. R.		8	16	I. Sh. E.		21	54.4	I. Ec. D.
	20	00	III. Sh. E.						8	39	I. Tr. E.		23	29	III. Tr. I.
	20	00.4	I. Ec. D.	26	11	38	I. Sh. I.		13	09	II. Sh. I.		23	57	III. Sh. E.
	21	22	III. Tr. E.		11	59	I. Tr. I.		13	55	II. Tr. I.				
	22	30	I. Oc. R.		13	47	I. Sh. E.		15	25	II. Sh. E.				
					14	09	I. Tr. E.		16	15	II. Tr. E.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

UNIVERSAL TIME

NOVEMBER

Phases of the Eclipses of the Satellites

I			III		
W		E	W		E
II			IV		
W		E	W	No Eclipse 	E

Configurations at 12^h 45^m

Day	West		East	
1			○	
2			○	
3			○	
4			○	
5			○	
6			○	
7			○	
8			○	
9			○	
10			○	
11			○	
12			○	
13			○	
14			○	
15			○	
16			○	
17			○	
18			○	
19			○	
20			○	
21			○	
22		·4 ·2	○	·1 3·
23		·4 ·1	○	·3· ²
24		3·	○	·4· ¹ 2·
25		3· 2· ·1	○	·4
26	○ 1·	·3 ·2	○	·4
27			○ ³ _{·1}	·2 ·4
28		1· 2·	○	·3 4·
29		·2	○	·1 3· 4·
30		1·	○	·2 3· 4·

UNIVERSAL TIME

DECEMBER

d	h	m		d	h	m		d	h	m		d	h	m	
1	0	31	I. Oc. R.	10	15	25	I. Sh. I.	18	22	31	III. Oc. D.	27	3	25	II. Tr. E.
	1	47	III. Tr. E.		16	00	I. Tr. I.						11	00.8	I.*Ec. D.
19	03		I. Sh. I.		17	34	I. Sh. E.	19	0	46	III. Oc. R.		14	01	I. Oc. R.
19	29		I. Tr. I.		18	10	I. Tr. E.		11	47	I.*Sh. I.				
21	13		I. Sh. E.		23	11.6	II. Ec. D.		12	29	I. Tr. I.	28	8	09	I. Sh. I.
21	39		I. Tr. E.						13	56	I. Sh. E.		8	58	I. Tr. I.
				11	2	40	II. Oc. R.		14	39	I. Tr. E.		10	18	I.*Sh. E.
2	2	26	II. Sh. I.		12	45.1	I. Ec. D.		20	55	II. Sh. I.		11	08	I.*Tr. E.
	3	20	II. Tr. I.		15	31	I. Oc. R.		22	20	II. Tr. I.		17	36.9	II. Ec. D.
	4	43	II. Sh. E.		15	43.6	III. Ec. D.		23	11	II. Sh. E.		21	36	II. Oc. R.
	5	39	II. Tr. E.		17	53.2	III. Ec. R.								
16	22.9		I. Ec. D.		18	06	III. Oc. D.	20	0	39	II. Tr. E.	29	5	29.1	I. Ec. D.
19	01		I. Oc. R.		20	23	III. Oc. R.		9	07.2	I. Ec. D.		8	30	I. Oc. R.
									12	01	I. Oc. R.		13	41	III. Sh. I.
3	13	32	I. Sh. I.	12	9	54	I. Sh. I.						15	49	III. Sh. E.
	14	00	I. Tr. I.		10	30	I.*Tr. I.	21	6	16	I. Sh. I.		17	06	III. Tr. I.
	15	41	I. Sh. E.		12	03	I. Sh. E.		6	59	I. Tr. I.		19	18	III. Tr. E.
	16	09	I. Tr. E.		12	40	I. Tr. E.		8	25	I. Sh. E.				
20	37.6		II. Ec. D.		18	20	II. Sh. I.		9	09	I. Tr. E.	30	2	37	I. Sh. I.
23	53		II. Oc. R.		19	33	II. Tr. I.		15	02.7	II. Ec. D.		3	28	I. Tr. I.
					20	36	II. Sh. E.		18	50	II. Oc. R.		4	46	I. Sh. E.
4	10	51.3	I.*Ec. D.		21	52	II. Tr. E.						5	38	I. Tr. E.
	11	45.8	III. Ec. D.					22	3	35.6	I. Ec. D.		12	47	II. Sh. I.
	13	31	I. Oc. R.	13	7	13.6	I. Ec. D.		6	31	I. Oc. R.		14	31	II. Tr. I.
	15	59	III. Oc. R.		10	01	I. Oc. R.		9	43	III. Sh. I.		15	03	II. Sh. E.
									11	51	III.*Sh. E.		16	48	II. Tr. E.
5	8	00	I. Sh. I.	14	4	22	I. Sh. I.		12	44	III. Tr. I.		23	57.5	I. Ec. D.
	8	30	I. Tr. I.		5	00	I. Tr. I.		14	58	III. Tr. E.				
	10	09	I. Sh. E.		6	31	I. Sh. E.					31	3	00	I. Oc. R.
	10	40	I. Tr. E.		7	09	I. Tr. E.						21	06	I. Sh. I.
	15	45	II. Sh. I.		12	28.6	II. Ec. D.	23	0	44	I. Sh. I.		21	58	I. Tr. I.
	16	46	II. Tr. I.		16	03	II. Oc. R.		1	29	I. Tr. I.		23	15	I. Sh. E.
	18	01	II. Sh. E.						2	53	I. Sh. E.				
	19	04	II. Tr. E.						3	39	I. Tr. E.				
				15	1	42.0	I. Ec. D.		10	12	II.*Sh. I.	32	0	07	I. Tr. E.
					4	31	I. Oc. R.		11	45	II.*Tr. I.		6	54.2	II. Ec. D.
6	5	19.8	I. Ec. D.		5	45	III. Sh. I.		12	28	II. Sh. E.		10	59	II.*Oc. R.
	8	01	I. Oc. R.		7	53	III. Sh. E.		14	02	II. Tr. E.		18	25.8	I. Ec. D.
					8	21	III. Tr. I.		22	04.0	I. Ec. D.		21	30	I. Oc. R.
7	2	28	I. Sh. I.		10	36	III.*Tr. E.								
	3	00	I. Tr. I.		22	50	I. Sh. I.	24	1	01	I. Oc. R.				
	4	38	I. Sh. E.		23	30	I. Tr. I.		19	12	I. Sh. I.				
	5	10	I. Tr. E.						19	59	I. Tr. I.				
9	54.5		II. Ec. D.						21	21	I. Sh. E.				
13	16		II. Oc. R.	16	1	00	I. Sh. E.		22	09	I. Tr. E.				
23	48.2		I. Ec. D.		1	39	I. Tr. E.								
					7	37	II. Sh. I.								
					8	56	II. Tr. I.								
8	1	47	III. Sh. I.		9	53	II. Sh. E.	25	4	19.9	II. Ec. D.				
	2	31	I. Oc. R.		11	14	II.*Tr. E.		8	13	II. Oc. R.				
	3	55	III. Sh. E.		20	10.4	I. Ec. D.		16	32.4	I. Ec. D.				
	3	55	III. Tr. I.		23	01	I. Oc. R.		19	31	I. Oc. R.				
	6	12	III. Tr. E.						23	38.3	III. Ec. D.				
20	57		I. Sh. I.	17	17	19	I. Sh. I.	26	1	48.1	III. Ec. R.				
21	30		I. Tr. I.		17	59	I. Tr. I.		2	53	III. Oc. D.				
23	06		I. Sh. E.		19	28	I. Sh. E.		5	07	III. Oc. R.				
23	40		I. Tr. E.		20	09	I. Tr. E.		13	41	I. Sh. I.				
									14	29	I. Tr. I.				
9	5	02	II. Sh. I.	18	1	45.7	II. Ec. D.		15	50	I. Sh. E.				
	6	09	II. Tr. I.		5	26	II. Oc. R.		16	38	I. Tr. E.				
	7	18	II. Sh. E.		14	38.8	I. Ec. D.		23	30	II. Sh. I.				
	8	28	II. Tr. E.		17	31	I. Oc. R.								
18	16.7		I. Ec. D.		19	41.0	III. Ec. D.	27	1	08	II. Tr. I.				
21	01		I. Oc. R.		21	50.7	III. Ec. R.		1	46	II. Sh. E.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

*Visible at Washington.

UNIVERSAL TIME

DECEMBER

Phases of the Eclipses of the Satellites

I					III					
W	*			E	W	*	*			E
	d					d	r			
II					IV					
W	*			E	W	No Eclipse				E
	d									

Configurations at 12^h 30^m

Day	West	East
1	3. ○ 1. 2. 4.	
2	3. 2. 1 4 ○.	
3	3 4. 2 ○ 1.	
4	4. ○ 2	1 ● 3 ●
5	4. 1. ○ 2. 3	
6	4. 2. ○ 1 3.	
7	4 1. ○ 3.	2 ●
8	4 3. ○ 1. 2.	
9	3. 1 2. ○	
10	3 2. 4 ○ 1.	
11	3. ○ 1 4 2	
12	○ 1. ○ 2. 3 4	
13	2. ○ 1 3 4	
14	1. 2 ○ 3. 4	
15	3. ○ 1 2. 4.	
16	3. 1 2. ○ 4.	
17	3 2 ○ 1. 4.	
18	3 1 ○ 2 4.	
19	○ 1. 4 ○ 2. 3	
20	4 2. ○ 1 3	
21	4. 2 1. ○ 3.	
22	4. 3 ○ 1 2	
23	○ 2. 4. 3 1. ○	
24	4 3 2 ○ 1.	
25	4 3 1 ○ 2	
26	4 ○ 1. 3 2.	
27	2. 4 ○ 3	1 ●
28	2 1. ○ 4 3.	
29	○ 3. 1 2 4	
30	3. 1. ○ 2. 4	
31	3. 2. ○ 1. 4	
32	3 1 ○ 2 4.	

ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION,
APPEARANCE, AND MAGNITUDE OF SATURN'S RINGS

0 ^h U. T.	<i>a</i>	<i>b</i>	<i>P</i>	<i>B</i>	<i>U</i>	ω	<i>B'</i>	<i>U'</i>	Stellar Mag.
	"	"	°	°	°	°	°	°	
Jan. -5	34.15	+15.36	+4.698	+26.730	131.068	41.257	+26.592	88.166	+0.7
3	34.29	15.42	4.796	26.730	132.088	41.256	26.604	88.436	0.7
11	34.47	15.50	4.889	26.721	133.074	41.255	26.615	88.706	0.7
19	34.71	15.60	4.976	26.704	134.014	41.255	26.626	88.975	0.8
27	34.99	15.71	5.057	26.680	134.898	41.254	26.636	89.245	0.8
Feb. 4	35.32	+15.84	+5.130	+26.651	135.714	41.253	+26.646	89.515	+0.8
12	35.69	15.99	5.195	26.619	136.454	41.253	26.655	89.785	0.8
20	36.09	16.15	5.252	26.585	137.107	41.252	26.664	90.055	0.8
28	36.54	16.33	5.300	26.552	137.664	41.251	26.672	90.324	0.7
Mar. 8	37.01	16.52	5.338	26.521	138.118	41.251	26.680	90.594	0.7
16	37.50	+16.73	+5.367	+26.493	138.463	41.250	+26.687	90.864	+0.7
24	38.00	16.94	5.386	26.471	138.694	41.249	26.694	91.134	0.7
Apr. 1	38.51	17.16	5.395	26.455	138.807	41.249	26.700	91.404	0.6
9	39.02	17.38	5.394	26.446	138.802	41.248	26.706	91.674	0.6
17	39.51	17.59	5.383	26.444	138.680	41.247	26.711	91.944	0.6
25	39.97	+17.80	+5.363	+26.450	138.446	41.247	+26.716	92.214	+0.5
3	40.39	18.00	5.334	26.462	138.107	41.246	26.720	92.484	0.5
11	40.76	18.17	5.297	26.479	137.674	41.245	26.724	92.754	0.4
19	41.06	18.32	5.253	26.501	137.159	41.245	26.727	93.023	0.4
27	41.29	18.44	5.202	26.527	136.579	41.244	26.730	93.293	0.3
June 4	41.45	+18.53	+5.147	+26.554	135.952	41.243	+26.732	93.563	+0.3
12	41.51	18.58	5.089	26.583	135.299	41.243	26.734	93.833	0.2
20	41.49	18.59	5.030	26.612	134.640	41.242	26.735	94.103	0.2
28	41.38	18.56	4.971	26.640	133.997	41.241	26.735	94.372	0.3
July 6	41.19	18.49	4.915	26.667	133.390	41.241	26.735	94.642	0.3
14	40.93	+18.39	+4.864	+26.694	132.838	41.240	+26.735	94.912	+0.4
22	40.59	18.25	4.820	26.719	132.359	41.239	26.734	95.182	0.4
30	40.20	18.09	4.783	26.745	131.968	41.239	26.732	95.451	0.5
Aug. 7	39.77	17.91	4.756	26.770	131.675	41.238	26.730	95.721	0.5
15	39.30	17.71	4.739	26.795	131.488	41.238	26.728	95.990	0.6
23	38.80	+17.51	+4.733	+26.821	131.415	41.237	+26.725	96.260	+0.6
31	38.30	17.29	4.738	26.846	131.458	41.236	26.722	96.529	0.6
Sept. 8	37.79	17.08	4.754	26.871	131.617	41.235	26.718	96.799	0.7
16	37.29	16.87	4.781	26.895	131.890	41.235	26.713	97.068	0.7
24	36.81	16.66	4.818	26.917	132.274	41.234	26.708	97.338	0.7
Oct. 2	36.35	+16.47	+4.865	+26.936	132.763	41.233	+26.703	97.607	+0.7
10	35.92	16.28	4.921	26.950	133.350	41.233	26.697	97.876	0.8
18	35.53	16.11	4.984	26.959	134.029	41.232	26.691	98.146	0.8
26	35.17	15.95	5.055	26.961	134.790	41.231	26.684	98.415	0.8
Nov. 3	34.86	15.80	5.131	26.955	125.624	41.231	26.676	98.685	0.8
11	34.59	+15.67	+5.211	+26.940	136.521	41.230	+26.668	98.954	+0.8
19	34.37	15.56	5.294	26.915	137.471	41.229	26.659	99.223	0.7
27	34.19	15.46	5.379	26.879	138.463	41.229	26.650	99.492	0.7
Dec. 5	34.07	15.38	5.465	26.833	139.486	41.228	26.641	99.761	0.7
13	34.00	15.32	5.551	26.777	140.529	41.228	26.631	100.030	0.7
21	33.98	+15.27	+5.635	+26.710	141.582	41.227	+26.620	100.299	+0.6
29	34.01	+15.24	+5.717	+26.634	142.633	41.226	+26.609	100.568	+0.7

The factor to be multiplied by *a* and *b* to obtain the axes of—

The inner ellipse of the outer ring=0.8801

The outer ellipse of the inner ring=0.8599

The inner ellipse of the inner ring=0.6650

The inner ellipse of the dusky ring=0.5486

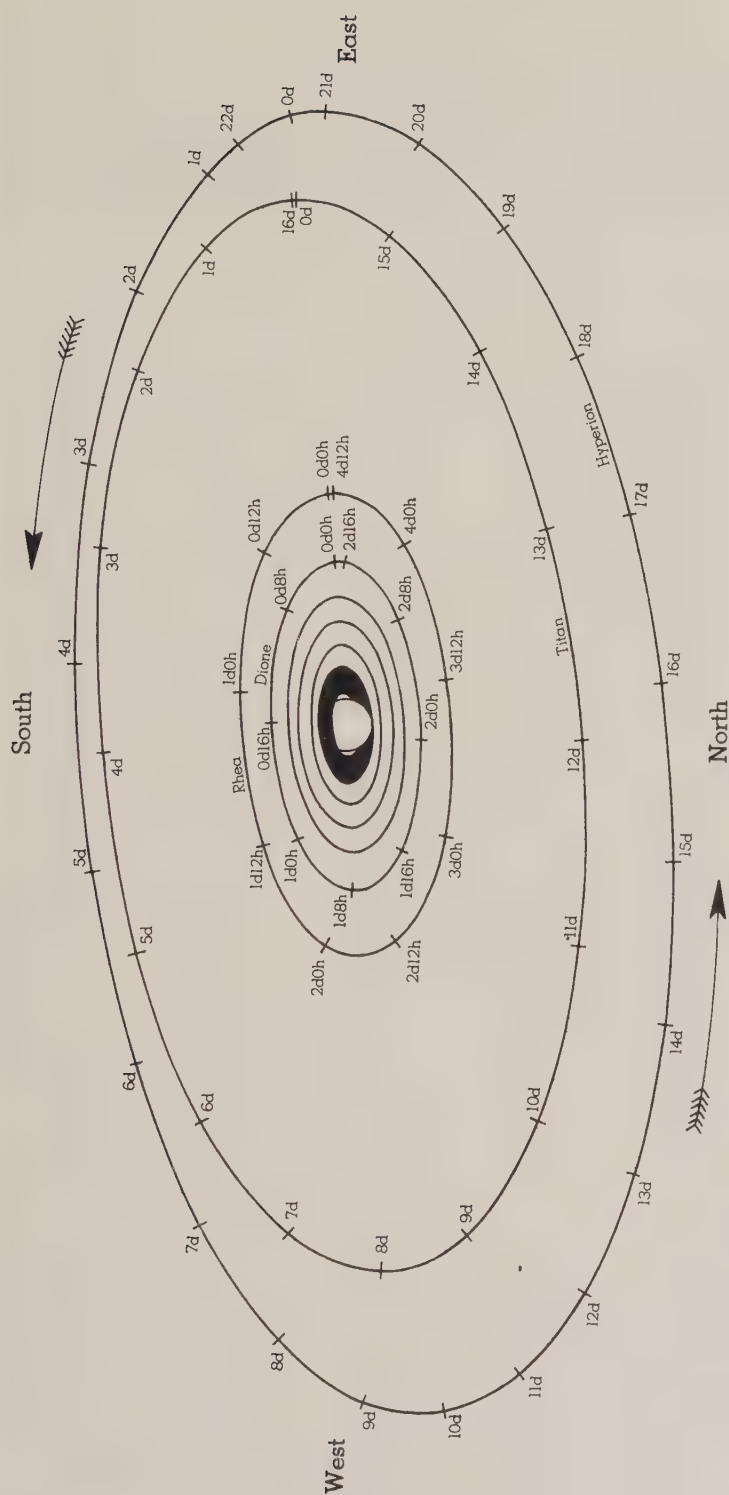
log factor=9.9445

log factor=9.9344

log factor=9.8228

log factor=9.7392

The positive sign of *B* indicates that the visible surface of the rings is the northern one.



MEAN	SYNODIC PERIODS	d	^h
I.	0	22.6	
II.	1	08.9	
III.	1	21.3	
IV.	2	17.7	
V.	4	12.5	
VI.	15	23.3	
VII.	21	07.6	
VIII.	79	22.1	
IX.	523	15.6	

APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN, AT DATE OF OPPOSITION, JUNE 13, 1958

I. Mimas
 II. Enceladus
 III. Tethys
 IV. Dione
 V. Rhea
 VI. Titan
 VII. Hyperion
 VIII. Iapetus
 IX. Phœbe

UNIVERSAL TIME

In the diagram on the preceding page the points of the orbits marked "0" are those of the eastern elongation. The times of these elongations may be found from the following tables, and the apparent position of a satellite at any other time may be marked on the diagram by setting off on the proper orbit the elapsed interval in days and hours since the last eastern elongation. The orbits of the five inner satellites are regarded as circular; but for Titan, Hyperion, and Iapetus the eccentricity is taken into account; also the times both of the greatest elongations and of the conjunctions are given.

MIMAS
Eastern Elongation

Jan.	d	h	Feb.	d	h	Apr.	d	h	May	d	h	July	d	h	Aug.	d	h	Oct.	d	h
	0	03.6		17	05.4		6	06.9		24	08.2		11	09.5		28	11.0		15	12.7
	1	02.2		18	04.0		7	05.5		25	06.8		12	08.1		29	09.6		16	11.3
	2	00.9		19	02.6		8	04.1		26	05.4		13	06.7		30	08.2		17	10.0
	2	23.5		20	01.2		9	02.7		27	04.0		14	05.3		31	06.8		18	08.6
	3	22.1		20	23.9		10	01.4		28	02.6		15	04.0	Sept.	1	05.5		19	07.2
	4	20.7		21	22.5		11	00.0		29	01.2		16	02.6		2	04.1		20	05.8
	5	19.4		21	22.1		11	22.6		29	23.8		17	01.2		3	02.7		21	04.5
	6	18.0		23	19.7		12	21.2		30	22.4		17	23.8		4	01.3		22	03.1
	7	16.6		24	18.3		13	19.8		31	21.1		18	22.4		4	23.9		23	01.7
	8	15.2		25	17.0		14	18.5	June	1	19.7		19	21.1		5	22.6		24	00.3
	9	13.9		26	15.6		15	17.1		2	18.3		20	19.7		6	21.2		24	23.0
	10	12.5		27	14.2		16	15.7		3	16.9		21	18.3		7	19.8		25	21.6
	11	11.1		28	12.8		17	14.3		4	15.5		22	16.9		8	18.4		26	20.2
	12	09.7	Mar.	1	11.4		18	12.9		5	14.1		23	15.5		9	17.0		27	18.8
	13	08.3		2	10.0		19	11.5		6	12.7		24	14.1		10	15.6		28	17.5
	14	07.0		3	08.6		20	10.1		7	11.3		25	12.7		11	14.3		29	16.1
	15	05.6		4	07.2		21	08.7		8	09.9		26	11.3		12	12.9		30	14.7
	16	04.2		5	05.9		22	07.4		9	08.6		27	10.0		13	11.5		31	13.3
	17	02.8		6	04.5		23	06.0		10	07.2		28	08.6		14	10.1	Nov.	1	12.0
	18	01.5		7	03.1		24	04.6		11	05.8		29	07.2		15	08.8		2	10.6
	19	00.1		8	01.7		25	03.2		12	04.4		30	05.8		16	07.4		3	09.2
	19	22.7		9	00.4		26	01.8		13	03.1		31	04.5		17	06.0		4	07.9
	20	21.3		9	23.0		27	00.4		14	01.7	Aug.	1	03.1		18	04.6		5	06.5
	21	20.0		10	21.6		27	23.0		15	00.3		2	01.7		19	03.3		6	05.1
	22	18.6		11	20.2		28	21.6		15	22.9		3	00.3		20	01.9		7	03.8
	23	17.2		12	18.8		29	20.3		16	21.5		3	22.9		21	00.5		8	02.4
	24	15.8		13	17.5	May	30	18.9		17	20.2		4	21.6		21	23.1		9	01.0
	25	14.5		14	16.1		1	17.5		18	18.8		5	20.2		22	21.8		9	23.6
	26	13.1		15	14.7		2	16.1		19	17.4		6	18.8		23	20.4		10	22.3
	27	11.7		16	13.3		3	14.7		20	16.0		7	17.4		24	19.0		11	20.9
	28	10.3		17	11.9		4	13.3		21	14.6		8	16.0		25	17.6		12	19.5
	29	08.9		18	10.5		5	11.9		22	13.2		9	14.6		26	16.2		13	18.1
	30	07.6		19	09.1		6	10.5		23	11.8		10	13.2		27	14.9		14	16.8
	31	06.2		20	07.7		7	09.1		24	10.4		11	11.8		28	13.5		15	15.4
Feb.	1	04.8		21	06.4		8	07.8		25	09.1		12	10.5		29	12.1		16	14.0
	2	03.4		22	05.0		9	06.4		26	07.7		13	09.1		30	10.7		17	12.6
	3	02.1		23	03.6		10	05.0		27	06.3		14	07.7	Oct.	1	09.4		18	11.3
	4	00.7		24	02.2		11	03.6		28	04.9		15	06.3		2	08.0		19	09.9
	4	23.3		25	00.9		12	02.2		29	03.5		16	05.0		3	06.6		20	08.5
	5	21.9		25	23.5		13	00.8		30	02.1		17	03.6		4	05.2		21	07.1
	6	20.6		26	22.1		13	23.4	July	1	00.7		18	02.2		5	03.9		22	05.8
	7	19.2		27	20.7		14	22.0		1	23.3		19	00.8		6	02.5		23	04.4
	8	17.8		28	19.3		15	20.7		2	22.0		19	23.4		7	01.1		24	03.0
	9	16.4		29	18.0		16	19.3		3	20.6		20	22.1		7	23.7		25	01.6
	10	15.1		30	16.6		17	17.9		4	19.2		21	20.7		8	22.4		26	00.3
	11	13.7		31	15.2		18	16.5		5	17.8		22	19.3		9	21.0		26	22.9
	12	12.3	Apr.	1	13.8		19	15.1		6	16.4		23	17.9		10	19.6		27	21.5
	13	10.9		2	12.4		20	13.7		7	15.0		24	16.5		11	18.2		28	20.1
	14	09.5		3	11.0		21	12.3		8	13.6		25	15.1		12	16.8		29	18.8
	15	08.1		4	09.6		22	10.9		9	12.2		26	13.7		13	15.5		30	17.4
	16	06.7		5	08.2		23	09.5		10	10.8		27	12.3		14	14.1		...	...

UNIVERSAL TIME

ENCELADUS—Eastern Elongation

Jan.	d h	Feb.	d h	Apr.	d h	May	d h	July	d h	Aug.	d h	Oct.	d h
0	17.9	17	17.3	6	16.3	24	15.0	11	13.7	28	12.6	15	11.9
2	02.8	19	02.2	8	01.2	25	23.9	12	22.6	29	21.5	16	20.8
3	11.7	20	11.1	9	10.1	27	08.7	14	07.4	31	06.4	18	05.7
4	20.6	21	19.9	10	19.0	28	17.6	15	16.3	Sept. 1	15.2	19	14.6
6	05.5	23	04.8	12	03.9	30	02.5	17	01.2	3	00.1	20	23.5
7	14.4	24	13.7	13	12.8	31	11.4	18	10.1	4	09.0	22	08.4
8	23.3	25	22.6	14	21.6	June 1	20.2	19	18.9	5	17.9	23	17.3
10	08.2	27	07.5	16	06.5	3	05.1	21	03.8	7	02.8	25	02.2
11	17.1	28	16.4	17	15.4	4	14.0	22	12.7	8	11.7	26	11.1
13	02.0	Mar. 2	01.3	19	00.3	5	22.9	23	21.6	9	20.6	27	20.0
14	10.9	3	10.2	20	09.1	7	07.7	25	06.5	11	05.5	29	04.9
15	19.8	4	19.1	21	18.0	8	16.6	26	15.4	12	14.4	30	13.8
17	04.7	6	04.0	23	02.9	10	01.5	28	00.2	13	23.3	31	22.7
18	13.6	7	12.9	24	11.8	11	10.4	29	09.1	15	08.2	Nov. 2	07.6
19	22.5	8	21.8	25	20.6	12	19.2	30	18.0	16	17.1	3	16.5
21	07.4	10	06.6	27	05.5	14	04.1	Aug. 1	02.9	18	02.0	5	01.4
22	16.3	11	15.5	28	14.4	15	13.0	2	11.8	19	10.9	6	10.3
24	01.2	13	00.4	29	23.3	16	21.9	3	20.7	20	19.8	7	19.2
25	10.1	14	09.3	May 1	08.1	18	06.7	5	05.5	22	04.7	9	04.1
26	19.0	15	18.2	2	17.0	19	15.6	6	14.4	23	13.6	10	13.0
28	03.9	17	03.1	4	01.9	21	00.5	7	23.3	24	22.5	11	21.9
29	12.8	18	12.0	5	10.8	22	09.4	9	08.2	26	07.4	13	06.8
30	21.7	19	20.9	6	19.6	23	18.3	10	17.1	27	16.3	14	15.7
Feb. 1	06.6	21	05.7	8	04.5	25	03.1	12	02.0	29	01.2	16	00.6
2	15.5	22	14.6	9	13.4	26	12.0	13	10.8	30	10.1	17	09.5
4	00.4	23	23.5	10	22.3	27	20.9	14	19.7	Oct. 1	19.0	18	18.4
5	09.2	25	08.4	12	07.1	29	05.8	16	04.6	3	03.9	20	03.3
6	18.1	26	17.3	13	16.0	30	14.7	17	13.5	4	12.7	21	12.2
8	03.0	28	02.2	15	00.9	July 1	23.6	18	22.4	5	21.6	22	21.1
9	11.9	29	11.0	16	09.8	3	08.4	20	07.3	7	06.5	24	06.0
10	20.8	30	19.9	17	18.6	4	17.3	21	16.1	8	15.4	25	14.9
12	05.7	Apr. 1	04.8	19	03.5	6	02.2	23	01.0	10	00.3	26	23.8
13	14.6	2	13.7	20	12.4	7	11.1	24	09.9	11	09.2	28	08.7
14	23.5	3	22.6	21	21.2	8	19.9	25	18.8	12	18.1	29	17.6
16	08.4	5	07.5	23	06.1	10	04.8	27	03.7	14	03.0	..	..

TETHYS—Eastern Elongation

Jan.	d h	Feb.	d h	Apr.	d h	May	d h	July	d h	Sept.	d h	Oct.	d h
1	10.5	19	13.1	9	15.2	28	16.8	16	18.3	3	20.3	22	22.7
3	07.8	21	10.4	11	12.5	30	14.1	18	15.6	5	17.6	24	20.1
5	05.2	23	07.7	13	09.8	June 1	11.4	20	12.9	7	14.9	26	17.4
7	02.5	25	05.0	15	07.1	3	08.7	22	10.2	9	12.2	28	14.7
8	23.8	27	02.4	17	04.4	5	06.0	24	07.5	11	09.5	30	12.1
10	21.2	28	23.7	19	01.7	7	03.3	26	04.8	13	06.9	Nov. 1	09.4
12	18.5	Mar. 2	21.0	20	23.0	9	00.6	28	02.1	15	04.2	3	06.7
14	15.8	4	18.3	22	20.3	10	21.9	29	23.4	17	01.5	5	04.1
16	13.2	6	15.6	24	17.6	12	19.2	31	20.7	18	22.8	7	01.4
18	10.5	8	12.9	26	14.9	14	16.4	Aug. 2	18.0	20	20.1	8	22.7
20	07.8	10	10.3	28	12.2	16	13.7	4	15.3	22	17.5	10	20.1
22	05.2	12	07.6	30	09.5	18	11.0	6	12.6	24	14.8	12	17.4
24	02.5	14	04.9	May 2	06.8	20	08.3	8	09.9	26	12.1	14	14.7
25	23.9	16	02.2	4	04.1	22	05.6	10	07.2	28	09.4	16	12.1
27	21.2	17	23.5	6	01.4	24	02.9	12	04.5	30	06.8	18	09.4
29	18.5	19	20.8	7	22.7	26	00.2	14	01.8	Oct. 2	04.1	20	06.7
31	15.8	21	18.1	9	20.0	27	21.5	15	23.1	4	01.4	22	04.1
Feb. 1	13.2	23	15.4	11	17.3	29	18.7	17	20.5	5	22.7	24	01.4
4	10.5	25	12.8	13	14.5	July 1	16.0	19	17.8	7	20.1	25	22.8
6	07.8	27	10.1	15	11.8	3	13.3	21	15.1	9	17.4	27	20.1
8	05.1	29	07.4	17	09.1	5	10.6	23	12.4	11	14.7	29	17.4
10	02.5	31	04.7	19	06.4	7	07.9	25	09.7	13	12.0	..	..
11	23.8	Apr. 2	02.0	21	03.7	9	05.2	27	07.0	15	09.4	..	..
13	21.1	3	23.3	23	01.0	11	02.5	29	04.3	17	06.7	..	..
15	18.4	5	20.6	24	22.3	12	23.8	31	01.6	19	04.0	..	..
17	15.8	7	17.9	26	19.6	14	21.1	Sept. 1	23.0	21	01.4	..	..

UNIVERSAL TIME

DIONE
Eastern Elongation

	d	h		d	h		d	h		d	h		d	h		d	h				
Jan.	1	11.6	Feb.	19	18.7	Apr.	10	01.4	May	29	07.2	July	17	12.9	Sept.	4	19.1	Oct.	24	02.2	
	4	05.3		22	12.4		12	19.0		June	1		00.9	20		06.5	7		12.8	26	19.9
	6	23.1		25	06.2		15	12.7		3	18.5		23	00.2		10	06.5		29	13.6	
	9	16.8		27	23.9		18	06.4		6	12.2		25	17.9		13	00.2		Nov.	1	07.3
	12	10.6		Mar.	2		17.6	21		00.1	9		05.8	28		11.6	15			17.9	4	01.1
	15	04.3	5	11.3	23	17.8	11	23.5	31	05.2	18	11.6	6	18.8							
	17	22.0	8	05.0	26	11.4	14	17.1	Aug.	2	22.9	21	05.4	9	12.6						
	20	15.8	10	22.8	29	05.1	17	10.8		5	16.5	23	23.1	12	06.3						
	23	09.5	13	16.5	May	1	22.7	20		04.4	8	10.2	26	16.8	15	00.0					
	26	03.3	16	10.2		4	16.4	22		22.0	11	03.9	29	10.5	17	17.8					
28	21.0	19	03.9	7	10.0	25	15.7	13		21.6	Oct.	2	04.3	20	11.5						
31	14.7	21	21.6	10	03.7	28	09.3	16	15.3	4		22.0	23	05.3							
Feb.	3	08.4	24	15.3	12	21.3	July	1	03.0	19		08.9	7	15.8	25	23.0					
	6	02.1	27	08.9	15	15.0		3	20.6	22	02.6	10	09.5	28	16.8						
	8	19.9	30	02.6	18	08.6		6	14.3	24	20.3	13	03.2	..	..						
	11	13.6	Apr.	1	20.3	21	02.3	9	07.9	27	14.0	15	20.9								
	14	07.3		4	14.0	23	19.9	12	01.6	30	07.7	18	14.7								
	17	01.0		7	07.7	26	13.6	14	19.2	Sept.	2	01.4	21	08.4							

RHEA
Eastern Elongation

	d	h		d	h		d	h		d	h		d	h		d	h			
Jan.	2	05.6	Feb.	20	23.7	Apr.	11	16.8	May	31	08.6	July	20	00.2	Sept.	7	16.6	Oct.	27	10.2
	6	18.3		25	12.3		16	05.2	June	4	20.9		24	12.5		12	05.1		31	22.8
	11	06.9	Mar.	2	00.8		20	17.6		9	09.2		29	00.9		16	17.6	Nov.	5	11.4
	15	19.5		6	13.3		25	06.0		13	21.6	Aug.	2	13.2		21	06.0		9	23.9
	20	08.0		11	01.8		29	18.3		18	09.9		7	01.6		25	18.5		14	12.5
	24	20.6		15	14.2	May	4	06.7		22	22.2		11	14.0		30	07.0		19	01.1
	29	09.1		20	02.7		8	19.0		27	10.5		16	02.4	Oct.	4	19.5		23	13.7
Feb.	2	21.6		24	15.1		13	07.4	July	1	22.8		20	14.8		9	08.0		28	02.3
	7	10.1		29	03.6		17	19.7		6	11.1		25	03.2		13	20.5		..	..
	11	22.7	Apr.	2	16.0		22	08.0		10	23.5		29	15.7		18	09.1			
	16	11.2		7	04.4		26	20.3		15	11.8	Sept.	3	04.2		22	21.6			

UNIVERSAL TIME

TITAN

Eastern Elongation			Inferior Conjunction			Western Elongation			Superior Conjunction		
	d	h		d	h		d	h		d	h
Jan.	11	10.7	Jan.	15	10.3	Jan.	3	14.7	Jan.	7	15.4
	27	11.2		31	10.9		19	15.6		23	16.0
Feb.	12	11.4	Feb.	16	11.2	Feb.	4	16.0	Feb.	8	16.3
	28	11.3		4	11.0		20	16.2		24	16.3
Mar.	16	10.7	Mar.	20	10.4	Mar.	8	16.0	Mar.	12	15.8
	1	09.7		5	09.3		24	15.3		28	14.9
Apr.	17	08.3	Apr.	21	07.7	Apr.	9	14.0	Apr.	13	13.6
	3	06.4		7	05.6		25	12.3		29	11.8
May	19	04.1	May	23	03.2	May	11	10.1	May	15	09.5
	4	01.5		8	00.5		27	07.6		31	07.0
June	19	22.9	June	23	21.7	June	12	04.8	June	16	04.4
	5	20.3		9	19.1		28	02.1		2	01.8
July	21	18.0	July	25	16.8	July	13	23.5	July	17	23.4
	6	16.0		10	14.9		29	21.3		2	21.3
Aug.	22	14.5	Aug.	26	13.4	Aug.	14	19.5	Aug.	18	19.7
	7	13.4		11	12.5		30	18.1		3	18.5
Sept.	23	12.8	Sept.	27	12.0	Sept.	15	17.3	Sept.	19	17.8
	9	12.6		13	12.0		1	17.0		5	17.5
Oct.	25	12.8	Oct.	29	12.4	Oct.	17	17.2	Oct.	21	17.6
	10	13.2		14	13.1		2	17.6		6	18.0
Nov.	26	13.9	Nov.	30	14.0	Nov.	18	18.4	Nov.	22	18.6
	..	..		..	..		..	..		..	..

HYPERION

Eastern Elongation			Inferior Conjunction			Western Elongation			Superior Conjunction		
	d	h		d	h		d	h		d	h
Jan.	18	14.4	Jan.	1	15.4	Jan.	6	16.0	Jan.	12	23.5
	9	01.8		23	02.4		28	04.1	Feb.	3	12.4
Feb.	2	12.8	Feb.	13	13.3	Feb.	18	16.0		25	00.7
	23	23.0		6	23.8		12	03.2	Mar.	18	11.9
Mar.	14	08.1	Mar.	28	09.5	Mar.	2	13.3	Apr.	8	22.0
	5	16.3		18	18.3		23	22.1		30	06.6
Apr.	26	23.6	Apr.	10	02.3	May	15	05.8	May	21	14.0
	17	06.3		31	09.4		5	12.6	June	11	20.6
May	8	12.7	May	21	16.0	June	26	18.8	July	3	02.7
	29	19.2		12	22.4		18	01.1		24	09.0
June	20	02.1	June	3	05.0	July	8	07.9	Aug.	14	15.9
	10	09.4		24	12.0		29	15.4	Sept.	4	23.6
Aug.	1	17.2	Sept.	14	19.5	Sept.	19	23.6		26	08.2
	23	01.3		6	03.3		11	08.4	Oct.	17	17.2
Oct.	13	09.4	Oct.	27	11.4	Nov.	1	17.9	Nov.	8	02.7
	..	..		17	19.5		23	03.5		29	12.2
	..	..		..	..		..	..		..	..

IAPETUS

Eastern Elongation			Inferior Conjunction			Western Elongation			Superior Conjunction		
	d	h		d	h		d	h		d	h
Mar.	2	09.8	Mar.	21	14.3	Jan.	20	18.7	Feb.	10	21.4
	20	14.2		8	07.8	Apr.	11	01.6	May	1	13.9
May	6	21.9	June	25	20.1	June	28	09.1	July	18	18.7
	25	20.2		14	06.3	Sept.	15	06.7	Oct.	6	05.5
Oct.	..	..	Nov.	..	..		..	..		..	..

SATELLITES OF SATURN, 1958

FOR 0^h UNIVERSAL TIME

DIFFERENTIAL COORDINATES OF PHOEBE

Date	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$	Date	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$	Date	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$
	m s	' "		m s	' "		m s	' "
Jan. 0	-1 58.8	+5 26	Apr. 20	-0 32.6	+3 01	Aug. 8	+1 28.8	-2 44
2	1 58.5	5 24	22	0 30.2	2 57	10	1 30.4	2 50
4	1 58.1	5 22	24	0 27.8	2 53	12	1 31.9	2 56
6	1 57.7	5 20	26	0 25.4	2 49	14	1 33.4	3 02
8	1 57.2	5 18	28	0 23.0	2 45	16	1 34.9	3 08
10	-1 56.7	+5 16	30	-0 20.6	+2 41	18	+1 36.3	-3 14
12	1 56.1	5 14	May 2	0 18.2	2 37	20	1 37.7	3 19
14	1 55.4	5 11	4	0 15.8	2 33	22	1 39.0	3 25
16	1 54.7	5 09	6	0 13.3	2 28	24	1 40.3	3 30
18	1 53.9	5 07	8	0 10.9	2 24	26	1 41.6	3 34
20	-1 53.1	+5 04	10	-0 08.5	+2 19	28	+1 42.8	-3 39
22	1 52.2	5 02	12	0 06.0	2 14	30	1 44.0	3 43
24	1 51.3	4 59	14	0 03.6	2 09	Sept. 1	1 45.1	3 48
26	1 50.3	4 57	16	-0 01.2	2 04	3	1 46.1	3 52
28	1 49.2	4 54	18	+0 01.3	1 58	5	1 47.1	3 56
30	-1 48.1	+4 52	20	+0 03.7	+1 53	7	+1 48.0	-3 59
Feb. 1	1 47.0	4 50	22	0 06.1	1 47	9	1 48.9	4 03
3	1 45.8	4 47	24	0 08.5	1 42	11	1 49.7	4 06
5	1 44.5	4 44	26	0 10.9	1 36	13	1 50.5	4 08
7	1 43.2	4 42	28	0 13.3	1 30	15	1 51.3	4 11
9	-1 41.9	+4 39	30	+0 15.7	+1 23	17	+1 52.0	-4 13
11	1 40.5	4 37	June 1	0 18.1	1 17	19	1 52.6	4 15
13	1 39.1	4 34	3	0 20.5	1 11	21	1 53.1	4 17
15	1 37.6	4 32	5	0 22.9	1 05	23	1 53.6	4 19
17	1 36.1	4 29	7	0 25.2	0 58	25	1 54.0	4 20
19	-1 34.5	+4 26	9	+0 27.6	+0 52	27	+1 54.3	-4 22
21	1 32.9	4 24	11	0 29.9	0 45	29	1 54.6	4 23
23	1 31.2	4 21	13	0 32.2	0 38	Oct. 1	1 54.8	4 23
25	1 29.5	4 19	15	0 34.5	0 31	3	1 54.9	4 24
27	1 27.8	4 16	17	0 36.8	0 24	5	1 55.0	4 24
Mar. 1	-1 26.0	+4 13	19	+0 39.1	+0 17	7	+1 55.0	-4 24
3	1 24.2	4 11	21	0 41.4	0 10	9	1 55.0	4 24
5	1 22.4	4 08	23	0 43.6	+0 02	11	1 54.8	4 23
7	1 20.5	4 06	25	0 45.9	-0 05	13	1 54.6	4 23
9	1 18.6	4 03	27	0 48.1	0 13	15	1 54.3	4 22
11	-1 16.7	+4 00	29	+0 50.3	-0 20	17	+1 53.9	-4 21
13	1 14.7	3 58	July 1	0 52.4	0 28	19	1 53.5	4 20
15	1 12.7	3 55	3	0 54.6	0 35	21	1 53.0	4 18
17	1 10.7	3 53	5	0 56.7	0 42	23	1 52.4	4 16
19	1 08.6	3 50	7	0 58.8	0 50	25	1 51.7	4 14
21	-1 06.5	+3 47	9	+1 00.9	-0 57	27	+1 51.0	-4 12
23	1 04.4	3 45	11	1 03.0	1 05	29	1 50.1	4 10
25	1 02.2	3 42	13	1 05.0	1 13	31	1 49.2	4 08
27	1 00.1	3 39	15	1 07.0	1 21	Nov. 2	1 48.2	4 05
29	0 57.9	3 36	17	1 09.0	1 28	4	1 47.2	4 02
31	-0 55.7	+3 33	19	+1 10.9	-1 35	6	+1 46.0	-3 59
Apr. 2	0 53.5	3 30	21	1 12.9	1 42	8	1 44.8	3 56
4	0 51.2	3 27	23	1 14.8	1 49	10	1 43.5	3 53
6	0 48.9	3 24	25	1 16.6	1 57	12	1 42.1	3 50
8	0 46.6	3 21	27	1 18.4	2 04	14	1 40.6	3 46
10	-0 44.3	+3 18	29	+1 20.2	-2 11	16	+1 39.0	-3 43
12	0 42.0	3 15	31	1 22.0	2 18	18	1 37.4	3 39
14	0 39.7	3 12	Aug. 2	1 23.8	2 25	20	1 35.7	3 35
16	0 37.3	3 08	4	1 25.5	2 31	22	+1 33.9	-3 31
18	-0 35.0	+3 05	6	+1 27.1	-2 38	..	..	..

Time from Eastern Elongation	Mimas		Time from Eastern Elongation	Enceladus		Tethys		Time from Eastern Elongation	Dione	
	p^1	F		p^1	F	p^1	F		p^1	F
h	°		d h	°		°		d h	°	
0.0	95.0	1.000	0 00	95.0	1.000	95.0	1.000	0 00	95.0	1.000
0.5	98.4	0.992	0 01	99.9	0.985	98.7	0.992	0 02	100.0	0.985
1.0	101.8	0.969	0 02	105.2	0.943	102.5	0.970	0 04	105.2	0.943
1.5	105.6	0.930	0 03	111.1	0.874	106.6	0.934	0 06	111.1	0.874
2.0	109.8	0.878	0 04	118.2	0.785	111.0	0.884	0 08	118.3	0.785
2.5	114.4	0.815	0 05	127.3	0.683	116.0	0.824	0 10	127.4	0.683
3.0	120.0	0.742	0 06	139.7	0.580	122.0	0.755	0 12	139.8	0.579
3.5	126.9	0.664	0 07	157.0	0.493	129.1	0.682	0 14	157.2	0.493
4.0	135.6	0.584	0 08	179.6	0.449	138.0	0.608	0 16	179.8	0.449
4.5	146.9	0.511	0 09	203.5	0.467	149.2	0.542	0 18	203.8	0.468
5.0	161.6	0.455	0 10	223.3	0.538	163.1	0.491	0 20	223.5	0.539
5.5	179.2	0.426	0 11	237.7	0.637	179.4	0.465	0 22	237.8	0.638
6.0	197.8	0.433	0 12	248.1	0.741	196.4	0.470	1 00	248.2	0.743
6.5	214.4	0.474	0 13	255.9	0.837	212.0	0.506	1 02	256.0	0.832
7.0	227.8	0.538	0 14	262.3	0.915	225.0	0.564	1 04	262.4	0.917
7.5	238.0	0.614	0 15	267.8	0.970	235.3	0.634	1 06	267.9	0.971
8.0	245.9	0.694	0 16	272.8	0.997	243.5	0.708	1 08	272.9	0.997
8.5	252.2	0.771	0 17	277.7	0.995	250.2	0.780	1 10	277.8	0.995
9.0	257.4	0.839	0 18	282.8	0.965	255.8	0.846	1 12	282.9	0.964
9.5	261.9	0.900	0 19	288.4	0.908	260.6	0.903	1 14	288.5	0.906
10.0	265.8	0.947	0 20	294.9	0.827	264.9	0.948	1 16	295.1	0.825
10.5	269.5	0.979	0 21	303.0	0.730	268.8	0.979	1 18	303.2	0.727
11.0	272.9	0.997	0 22	313.7	0.625	272.6	0.997	1 20	314.1	0.622
11.5	276.3	0.999	0 23	328.7	0.528	276.3	0.999	1 22	329.2	0.525
12.0	279.7	0.985	1 00	349.1	0.462	280.0	0.986	2 00	349.8	0.461
12.5	283.3	0.956	1 01	13.2	0.451	283.9	0.959	2 02	13.9	0.452
13.0	287.2	0.912	1 02	35.2	0.501	288.0	0.918	2 04	35.9	0.504
13.5	291.5	0.856	1 03	51.9	0.591	292.7	0.865	2 06	52.4	0.595
14.0	296.5	0.788	1 04	63.8	0.695	298.0	0.801	2 08	64.2	0.699
14.5	302.5	0.712	1 05	72.7	0.796	304.3	0.730	2 10	73.0	0.800
15.0	310.0	0.633	1 06	79.6	0.884	312.0	0.656	2 12	79.8	0.887
15.5	319.6	0.555	1 07	85.4	0.949	321.6	0.584	2 14	85.6	0.951
16.0	332.1	0.487	1 08	90.6	0.989	333.7	0.522	2 16	90.8	0.990
16.5	348.0	0.440	1 09	95.6	1.000	348.5	0.479	2 18	95.8	1.000
17.0	6.4	0.424	1 10	100.5	0.982	5.3	0.463	2 20	100.8	0.981
17.5	24.5	0.445	1 11			22.1	0.480			
18.0	39.9	0.496	1 12			36.8	0.524			
18.5	52.0	0.566	1 13			48.8	0.587			
19.0	61.2	0.645	1 14			58.4	0.659			
19.5	68.5	0.725	1 15			66.0	0.733			
20.0	74.3	0.798	1 16			72.2	0.804			
20.5	79.2	0.864	1 17			77.5	0.867			
21.0	83.4	0.919	1 18			82.1	0.920			
21.5	87.2	0.961	1 19			86.2	0.960			
22.0	90.8	0.988	1 20			90.1	0.987			
22.5	94.2	1.000	1 21			93.9	0.999			
23.0	97.6	0.995	1 22			97.6	0.996			

Position angle of satellite $p = p^1 + (P - P_0)$ Apparent distance of satellite $s = F \frac{a(p)}{\rho}$

Time from Eastern Elongation	Rhea		Time from Eastern Elongation	Titan		Hyperion		Time from Eastern Elongation	Iapetus	
	p^1	F		p^1	F	p^1	F		p^1	F
d h	°		d h	°		°		d	°	
0 00	95.0	1.000	0 00	96.0	0.978	96.0	0.933	0	103.0	0.972
0 03	99.5	0.988	0 10	100.4	0.970	99.6	0.916	2	105.3	0.959
0 06	104.3	0.953	0 20	104.9	0.940	103.5	0.886	4	107.7	0.921
0 09	109.6	0.896	1 06	109.9	0.890	107.7	0.842	6	110.4	0.860
0 12	115.6	0.821	1 16	115.5	0.823	112.3	0.787	8	113.6	0.777
0 15	123.2	0.732	2 02	122.3	0.742	117.8	0.722	10	117.6	0.677
0 18	132.8	0.637	2 12	130.8	0.655	124.6	0.648	12	123.1	0.564
0 21	145.8	0.548	2 22	142.0	0.570	132.8	0.575	14	131.8	0.442
1 00	163.1	0.480	3 08	156.8	0.498	143.6	0.505	16	146.7	0.327
1 03	184.2	0.452	3 18	175.3	0.456	157.5	0.447	18	174.1	0.246
1 06	205.5	0.476	4 04	195.7	0.456	174.6	0.413	20	211.7	0.247
1 09	223.2	0.542	4 14	214.2	0.499	193.2	0.413	22	238.9	0.329
1 12	236.4	0.631	5 00	228.8	0.572	210.3	0.445	24	253.6	0.445
1 15	246.2	0.726	5 10	239.8	0.659	224.4	0.503	26	262.1	0.567
1 18	253.8	0.815	5 20	248.3	0.748	235.2	0.575	28	267.6	0.683
1 21	260.0	0.891	6 06	255.0	0.832	243.5	0.653	30	271.5	0.787
2 00	265.3	0.949	6 16	260.5	0.904	250.0	0.730	32	274.6	0.875
2 03	270.1	0.986	7 02	265.2	0.961	255.3	0.803	34	277.2	0.945
2 06	274.7	1.000	7 12	269.6	1.000	259.8	0.870	36	279.5	0.994
2 09	279.2	0.990	7 22	273.6	1.020	263.6	0.927	38	281.6	1.022
2 12	284.0	0.956	8 08	277.6	1.018	267.1	0.975	40	283.6	1.027
2 15	289.2	0.900	8 18	281.7	0.997	270.3	1.012	42	285.7	1.010
2 18	295.2	0.826	9 04	286.0	0.954	273.2	1.039	44	287.8	0.971
2 21	302.6	0.738	9 14	290.9	0.894	276.1	1.054	46	290.2	0.911
3 00	312.0	0.644	10 00	296.6	0.817	278.9	1.058	48	293.0	0.832
3 03	324.7	0.554	10 10	303.5	0.728	281.7	1.052	50	296.5	0.736
3 06	341.7	0.483	10 20	312.5	0.634	284.5	1.035	52	301.2	0.626
3 09	2.7	0.453	11 06	324.7	0.543	287.5	1.009	54	307.9	0.508
3 12	24.1	0.473	11 16	341.1	0.470	290.7	0.974	56	318.7	0.388
3 15	42.1	0.537	12 02	1.8	0.435	294.1	0.931	58	338.3	0.285
3 18	55.6	0.624	12 12	23.4	0.449	297.9	0.881	60	11.7	0.237
3 21	65.6	0.719	12 22	42.0	0.507	302.2	0.825	62	46.0	0.278
4 00	73.4	0.809	13 08	55.9	0.591	307.1	0.766	64	66.8	0.378
4 03	79.6	0.886	13 18	66.2	0.684	312.9	0.704	66	78.2	0.496
4 06	85.0	0.946	14 04	74.1	0.773	319.8	0.643	68	85.2	0.614
4 09	89.8	0.984	14 14	80.3	0.852	328.1	0.586	70	90.0	0.721
4 12	94.4	1.000	15 00	85.6	0.913	338.0	0.537	72	93.6	0.814
4 15	98.9	0.991	15 10	90.4	0.956	349.7	0.502	74	96.6	0.887
			15 20	94.8	0.976	2.6	0.483	76	99.1	0.939
			16 06	99.2	0.974	16.1	0.485	78	101.5	0.967
			16 16			28.9	0.506	80	103.8	0.970
			17 02			40.2	0.544	82	106.1	0.949
			17 12			49.9	0.594			
			17 22			58.0	0.650			
			18 08			64.8	0.708			
			18 18			70.5	0.764			
			19 04			75.5	0.815			
			19 14			80.0	0.860			
			20 00			84.0	0.896			
			20 10			87.8	0.921			
			20 20			91.4	0.935			
			21 06			95.0	0.935			
			21 16			98.6	0.922			

Position angle of satellite $p = p^1 + (P - P_0)$

Apparent distance of satellite $s = F \frac{a(\rho)}{\rho}$

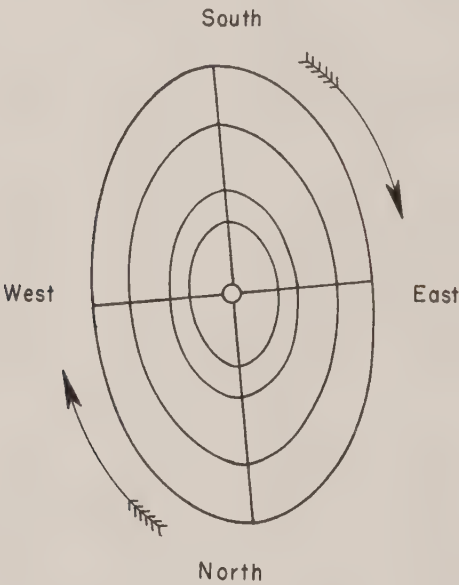
Date	Rhea		Titan		Hyperion		Iapetus	
	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$
	°	"	°	"	°	"	°	"
Jan. 0	-0.3	66.3	-0.7	154	-0.8	187	+0.3	448
5	0.2	66.5	0.7	154	0.7	188	0.2	449
10	0.1	66.7	0.6	155	0.7	188	+0.1	450
15	-0.1	67.0	0.6	155	0.6	189	0.0	452
20	0.0	67.3	0.5	156	0.6	190	0.0	454
25	0.0	67.6	0.5	157	0.5	191	-0.1	457
30	+0.1	68.0	0.4	158	0.5	192	0.2	459
Feb. 4	0.1	68.4	0.4	158	0.4	193	0.3	462
9	0.2	68.8	0.3	159	0.4	194	0.3	465
14	0.2	69.3	0.3	161	0.4	195	0.4	468
19	0.3	69.8	0.3	162	0.3	197	0.5	471
24	0.3	70.3	0.3	163	0.3	198	0.5	475
Mar. 1	0.3	70.9	0.2	164	0.3	200	0.6	479
6	0.4	71.4	0.2	166	0.3	201	0.6	482
11	0.4	72.0	0.2	167	0.2	203	0.7	486
16	0.4	72.6	0.2	168	0.2	205	0.7	490
21	0.4	73.2	0.2	170	0.2	207	0.7	494
26	0.4	73.8	0.1	171	0.2	208	0.7	499
31	0.4	74.5	0.1	173	0.2	210	0.7	503
Apr. 5	0.4	75.1	0.1	174	0.2	212	0.7	507
10	0.4	75.7	0.1	175	0.2	213	0.7	511
15	0.4	76.3	0.1	177	0.2	215	0.7	515
20	0.4	76.9	0.2	178	0.2	217	0.7	519
25	0.4	77.4	0.2	179	0.2	218	0.7	523
30	0.4	77.9	0.2	181	0.2	220	0.7	526
May 5	0.4	78.4	0.2	182	0.3	221	0.6	529
10	0.4	78.8	0.2	183	0.3	222	0.6	532
15	0.3	79.2	0.2	184	0.3	224	0.5	535
20	0.3	79.6	0.3	184	0.3	224	0.5	537
25	0.3	79.9	0.3	185	0.4	225	0.4	539
30	0.2	80.1	0.3	186	0.4	226	0.4	541
June 4	0.2	80.3	0.4	186	0.4	226	0.3	542
9	0.2	80.4	0.4	186	0.5	227	0.3	543
14	0.1	80.4	0.4	186	0.5	227	0.2	543
19	+0.1	80.4	0.5	186	0.5	227	0.1	543
24	0.0	80.3	0.5	186	0.6	226	-0.1	542
29	0.0	80.1	0.5	186	0.6	226	0.0	541
July 4	-0.1	79.9	0.5	185	0.6	225	0.0	539
9	0.1	79.6	0.6	184	0.7	225	+0.1	538
14	0.1	79.3	0.6	184	0.7	224	0.1	535
19	0.1	78.9	0.7	183	0.7	222	0.2	533
24	0.2	78.4	0.7	182	0.8	221	0.2	530
29	0.2	78.0	0.7	181	0.8	220	0.2	526
Aug. 3	0.2	77.4	0.7	179	0.8	218	0.3	523
8	0.2	76.9	0.7	178	0.8	217	0.3	519
13	0.2	76.3	0.7	177	0.8	215	0.3	515
18	0.2	75.7	0.7	176	0.8	214	0.3	511
23	0.2	75.1	0.7	174	0.8	212	0.3	507
28	0.2	74.5	0.7	173	0.8	210	0.3	503
Sept. 2	0.2	73.9	0.7	171	0.8	209	0.3	499
7	0.2	73.3	0.7	170	0.8	207	0.3	495
12	0.2	72.7	0.7	168	0.8	205	0.3	491
17	0.2	72.1	0.7	167	0.8	203	0.3	487
22	0.2	71.5	0.7	166	0.8	202	0.2	483
27	0.1	70.9	0.6	164	0.7	200	0.2	479
Oct. 2	0.1	70.4	0.6	163	0.7	199	0.2	475
7	-0.1	69.9	0.6	162	0.7	197	+0.1	472
12	0.0	69.4	0.6	161	0.7	196	0.0	468
17	0.0	68.9	0.5	160	0.6	194	0.0	465
22	+0.1	68.4	0.5	159	0.5	193	-0.1	462
27	0.1	68.0	0.4	158	0.5	192	0.1	459
Nov. 1	0.2	67.6	0.4	157	0.5	191	0.2	457
6	0.2	67.3	0.3	156	0.4	190	0.3	454
11	0.3	67.0	0.3	155	0.4	189	0.4	453
16	0.3	66.7	0.3	155	0.3	188	0.5	450
21	0.4	66.5	0.2	154	0.2	187	0.6	449
26	0.5	66.3	0.2	154	0.2	187	0.7	447
Dec. 1	+0.5	66.1	-0.1	153	-0.1	186	-0.8	446
...	...	...	...	...	...	...	...	...

Time from Northern Elongation	Ariel		Umbriel		Time from Northern Elongation	Titania		Time from Northern Elongation	Oberon	
	p^1	F	p^1	F		p^1	F		p^1	F
d h	°		°		d h	°		d h	°	
0 00	5.0	1.000	5.0	1.000	0 00	5.0	1.000	0 00	5.0	1.000
0 02	357.8	0.986	0.6	0.995	0 05	359.8	0.993	0 08	359.6	0.992
0 04	350.1	0.947	356.2	0.980	0 10	354.4	0.972	0 16	354.0	0.970
0 06	341.6	0.885	351.5	0.955	0 15	348.7	0.938	1 00	348.1	0.933
0 08	331.6	0.808	346.6	0.922	0 20	342.5	0.892	1 08	341.6	0.885
0 10	319.3	0.726	341.2	0.882	1 01	335.6	0.838	1 16	334.3	0.828
0 12	304.2	0.654	335.3	0.836	1 06	327.7	0.780	2 00	325.9	0.767
0 14	286.0	0.609	328.7	0.787	1 11	318.4	0.721	2 08	316.0	0.707
0 16	266.4	0.607	321.2	0.737	1 16	307.6	0.667	2 16	304.3	0.654
0 18	247.9	0.646	312.6	0.689	1 21	295.2	0.626	3 00	291.0	0.617
0 20	232.3	0.716	302.8	0.649	2 02	281.4	0.605	3 08	276.4	0.602
0 22	219.8	0.798	291.9	0.619	2 07	267.1	0.606	3 16	261.8	0.612
1 00	209.5	0.876	280.2	0.604	2 12	253.5	0.630	4 00	248.2	0.646
1 02	200.9	0.940	268.2	0.605	2 17	241.2	0.672	4 08	236.2	0.696
1 04	193.1	0.983	256.6	0.623	2 22	230.5	0.727	4 16	225.9	0.755
1 06	185.9	1.000	245.8	0.654	3 03	221.4	0.786	5 00	217.2	0.817
1 08	178.7	0.989	236.2	0.696	3 08	213.6	0.844	5 08	209.7	0.875
1 10	171.1	0.953	227.8	0.743	3 13	206.8	0.897	5 16	203.1	0.925
1 12	162.7	0.893	220.4	0.793	3 18	200.6	0.942	6 00	197.1	0.964
1 14	152.9	0.818	213.9	0.842	3 23	195.0	0.975	6 08	191.5	0.989
1 16	141.0	0.736	208.0	0.888	4 04	189.7	0.994	6 16	186.0	1.000
1 18	126.2	0.661	202.7	0.927	4 09	184.5	1.000	7 00	180.7	0.995
1 20	108.3	0.613	197.8	0.959	4 14	179.2	0.991	7 08	175.1	0.975
1 22	88.8	0.605	193.2	0.982	4 19	173.8	0.969	7 16	169.3	0.941
2 00	70.0	0.640	188.8	0.996	5 00	168.1	0.933	8 00	163.0	0.895
2 02	54.1	0.707	184.4	1.000	5 05	161.8	0.887	8 08	155.8	0.840
2 04	41.2	0.788	180.0	0.993	5 10	154.8	0.832	8 16	147.6	0.779
2 06	30.7	0.867	175.5	0.977	5 15	146.8	0.773	9 00	138.0	0.718
2 08	21.9	0.933	170.9	0.951	5 20	137.4	0.715	9 08	126.8	0.664
2 10	14.0	0.979	165.9	0.917	6 01	126.4	0.662	9 16	113.7	0.623
2 12	6.8	0.999	160.5	0.876	6 06	113.7	0.623	10 00	99.3	0.603
2 14	359.6	0.992	154.5	0.829	6 11	99.9	0.604	10 08	84.6	0.609
2 16			147.7	0.780	6 16	85.6	0.607	10 16	70.7	0.638
2 18			140.1	0.730	6 21	72.1	0.634	11 00	58.4	0.685
2 20			131.3	0.683	7 02	59.9	0.678	11 08	47.8	0.743
2 22			121.4	0.644	7 07	49.5	0.733	11 16	38.8	0.805
3 00			110.4	0.616	7 12	40.5	0.792	12 00	31.1	0.864
3 02			98.6	0.603	7 17	32.8	0.850	12 08	24.3	0.916
3 04			86.6	0.606	7 22	26.1	0.903	12 16	18.2	0.957
3 06			75.1	0.626	8 03	20.0	0.946	13 00	12.5	0.985
3 08			64.5	0.659	8 08	14.4	0.977	13 08	7.1	0.999
3 10			55.0	0.702	8 13	9.1	0.996	13 16	1.7	0.997
3 12			46.7	0.750	8 18	3.9	1.000			
3 14			39.4	0.800						
3 16			33.0	0.849						
3 18			27.3	0.893						
3 20			22.1	0.932						
3 22			17.2	0.963						
4 00			12.6	0.985						
4 02			8.2	0.997						
4 04			3.8	1.000						

Position angle of satellite $p = p^1 + (P - P_0)$ Apparent distance of satellite $s = F \frac{a(\rho)}{\rho}$

SATELLITES OF URANUS, 1958

APPARENT ORBITS OF SATELLITES I-IV OF URANUS AT DATE OF
OPPOSITION, JANUARY 30, 1958



NAMES OF THE SATELLITES

V	Miranda
I	Ariel
II	Umbriel
III	Titania
IV	Oberon

SIDEREAL PERIODS

d	h
1.4	
2	12.489
4	03.460
8	16.941
13	11.118

UNIVERSAL TIME

ARIEL—Northern Elongation

Jan.	d h 1 21.8 4 10.3 6 22.7 9 11.2 11 23.7 14 12.2 17 00.7 19 13.2 22 01.7 24 14.2 27 02.7 29 15.2 Feb. 1 03.7	Feb.	d h 3 16.2 6 04.6 8 17.1 11 05.6 13 18.1 16 06.6 18 19.1 21 07.6 23 20.1 26 08.6 28 21.1 Mar. 3 09.6 5 22.1	Mar.	d h 8 10.6 10 23.1 13 11.6 16 00.1 18 12.6 21 01.1 23 13.6 26 02.1 28 14.6 31 03.0 Apr. 2 15.5 5 04.0 7 16.5	Apr.	d h 10 05.0 12 17.5 15 06.0 17 18.5 20 07.0 22 19.5 25 08.0 27 20.5 30 09.0 May 2 21.5 5 10.0 7 22.5 10 10.9	May	d h 12 23.4 15 11.9 18 00.4 20 12.9 23 01.4 Oct. 13 17.0 16 05.5 18 18.0 21 06.5 23 19.0 26 07.5 28 19.9	Oct.	d h 31 08.4 Nov. 2 20.9 5 09.4 7 21.9 10 10.3 12 22.8 15 11.3 17 23.8 20 12.3 23 00.8 25 13.2 28 01.7 30 14.2	Dec.	d h 3 02.7 5 15.2 8 03.7 10 16.1 13 04.6 15 17.1 18 05.6 20 18.1 23 06.6 25 19.1 28 07.6 30 20.0 33 08.5
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UMBRIEL—Northern Elongation

Jan.	d h 2 07.4 6 10.9 10 14.3 14 17.8 18 21.3 23 00.7 27 04.2 31 07.7	Feb.	d h 4 11.2 8 14.6 12 18.1 16 21.6 21 01.0 25 04.5 Mar. 1 08.0 5 11.5	Mar.	d h 9 14.9 13 18.4 17 21.9 22 01.3 26 04.8 30 08.3 Apr. 3 11.8 7 15.2	Apr.	d h 11 18.7 15 22.2 20 01.7 24 05.1 28 08.6 May 2 12.0 6 15.5 10 19.0	May	d h 14 22.4 19 01.9 23 05.4 Oct. 15 06.0 19 09.5 23 12.9 27 16.4	Oct.	d h 31 19.8 Nov. 4 23.3 9 02.7 13 06.2 17 09.6 21 13.1 25 16.5 29 20.0	Dec.	d h 3 23.4 8 02.9 12 06.3 16 09.8 20 13.3 24 16.7 28 20.2 32 23.6
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UNIVERSAL TIME

TITANIA—Northern Elongation

Jan.	d h 6 04.9 14 21.9 23 14.9	Feb.	d h 18 17.9 27 10.8 8 03.8	Apr.	d h 3 06.8 11 23.7 20 16.7 29 09.6	May	d h 16 19.5 25 12.4	Oct.	d h 20 11.5 29 04.4 6 21.3 15 14.2 24 07.1	Dec.	d h 3 00.0 11 17.0 20 09.9 29 02.9 37 19.8
Feb.	1 07.9 10 00.9	Mar.	16 20.8 25 13.8	May	8 02.6	Oct.	11 18.6				

OBERON—Northern Elongation

Jan.	d h 11 01.2 24 12.4	Feb.	d h 20 10.9 5 22.1	Apr.	d h 1 20.5 15 07.7 28 18.8	May	d h 12 05.9 25 16.9	Nov.	d h 3 04.8 16 15.9 30 03.0	Dec.	d h 13 14.1 27 01.3 40 12.5
Feb.	6 23.6	Mar.	19 09.3								

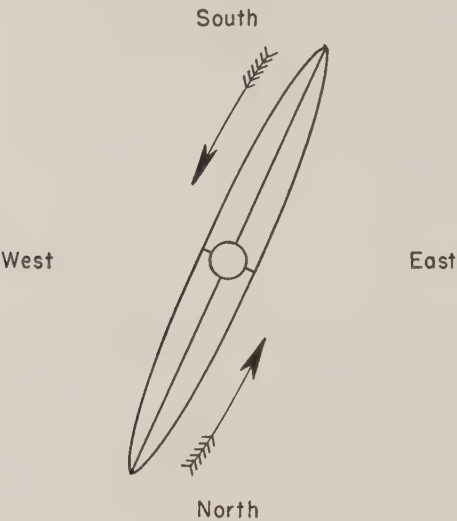
FOR 0^h UNIVERSAL TIME

Date	$P-P_0$	$\frac{a(\rho)}{\rho}$				Date	$P-P_0$	$\frac{a(\rho)}{\rho}$			
		Ariel	Umbriel	Titania	Oberon			Ariel	Umbriel	Titania	Oberon
Jan. 0	° +0.6	" 15.0	" 20.9	" 34.3	" 45.8	May 10	° -0.8	" 14.2	" 19.8	" 32.4	" 43.4
10	0.4	15.1	21.0	34.4	46.0	20	0.7	14.1	19.6	32.1	43.0
20	+0.2	15.1	21.0	34.5	46.1	30	-0.5	14.0	19.4	31.9	42.6
30	0.0	15.1	21.0	34.5	46.2	Oct. 13	+2.6	14.0	19.5	32.0	42.8
Feb. 9	-0.2	15.1	21.0	34.5	46.2	23	+2.7	14.1	19.7	32.3	43.2
19	-0.4	15.1	21.0	34.4	46.0	Nov. 2	2.8	14.3	19.9	32.6	43.6
Mar. 1	0.5	15.0	20.9	34.3	45.8	12	2.9	14.4	20.0	32.9	44.0
11	0.7	14.9	20.8	34.1	45.6	22	2.9	14.5	20.2	33.2	44.4
21	0.8	14.8	20.6	33.9	45.3	Dec. 2	2.9	14.7	20.4	33.5	44.8
31	0.9	14.7	20.5	33.6	44.9	12	+2.8	14.8	20.6	33.8	45.2
Apr. 10	-0.9	14.6	20.3	33.3	44.5	22	2.7	14.9	20.7	34.0	45.5
20	0.9	14.4	20.1	33.0	44.2	32	+2.6	15.0	20.9	34.3	45.8
30	-0.9	14.3	19.9	32.7	43.8						

SATELLITES OF NEPTUNE, 1958

Time from Eastern Elongation	Triton		Time from Eastern Elongation	Triton		Time from Eastern Elongation	Triton		Time from Eastern Elongation	Triton	
	p^1	F		p^1	F		p^1	F		p^1	F
d h	°		d h	°		d h	°		d h	°	
0 00	156.0	1.000	1 12	261.1	0.127	3 00	336.5	0.998	4 12	105.0	0.157
0 03	156.9	0.991	1 15	300.0	0.205	3 03	337.4	0.980	4 15	128.7	0.259
0 06	157.9	0.965	1 18	314.5	0.318	3 06	338.4	0.946	4 18	138.3	0.376
0 09	159.0	0.922	1 21	321.2	0.435	3 09	339.5	0.895	4 21	143.4	0.491
0 12	160.1	0.863	2 00	325.1	0.547	3 12	340.8	0.828	5 00	146.5	0.600
0 15	161.5	0.789	2 03	327.8	0.652	3 15	342.3	0.747	5 03	148.8	0.700
0 18	163.2	0.701	2 06	329.7	0.746	3 18	344.2	0.653	5 06	150.5	0.787
0 21	165.4	0.602	2 09	331.2	0.827	3 21	346.8	0.549	5 09	151.8	0.862
1 00	168.6	0.493	2 12	332.5	0.894	4 00	350.7	0.436	5 12	153.0	0.921
1 03	173.6	0.377	2 15	333.6	0.945	4 03	357.4	0.320	5 15	154.1	0.965
1 06	183.1	0.261	2 18	334.6	0.980	4 06	11.7	0.207	5 18	155.0	0.991
1 09	206.4	0.158	2 21	335.5	0.998	4 09	50.1	0.127	5 21	156.0	1.000

Position angle of satellite $p = p^1 + (P - P_0)$ Apparent distance of satellite $s = F \frac{a(\rho)}{\rho}$



NAMES OF THE SATELLITES

I Triton
II Nereid

SIDEREAL PERIODS

5^d 21^h.044
359^d

TRITON

UNIVERSAL TIME
Eastern Elongation

Jan.	d	h	Feb.	d	h	Apr.	d	h	June	d	h	July	d	h	Sept.	d	h
	0	11.0		22	08.2		16	05.8		8	03.6		31	01.2		21	22.4
	6	08.0		28	05.3		22	02.9		14	00.7		5	22.2		..	..
	12	05.0	Mar.	6	02.3		28	00.0		19	21.8		11	19.3		1	10.2
	18	02.0		11	23.4	May	3	21.1		25	18.8		17	16.3		7	07.2
	23	23.0		17	20.4		9	18.2		1	15.9		23	13.3		13	04.2
	29	20.0		23	17.5		15	15.3		7	13.0		29	10.3		19	01.2
Feb.	4	17.1		29	14.6		21	12.4		13	10.0	Sept.	4	07.3		24	22.2
	10	14.1	Apr.	4	11.7		27	09.4		19	07.1		10	04.4		30	19.2
	16	11.2		10	08.7	June	2	06.5		25	04.1		16	01.4		36	16.2

FOR 0^h UNIVERSAL TIME

Date	P-P ₀	$\frac{a(\rho)}{\rho}$	Date	P-P ₀	$\frac{a(\rho)}{\rho}$	Date	P-P ₀	$\frac{a(\rho)}{\rho}$	Date	P-P ₀	$\frac{a(\rho)}{\rho}$
Jan. 0	-0.5	15.9	Mar. 21	-0.4	16.6	June 9	+0.1	16.5	Aug. 28	+0.1	15.9
10	0.6	16.0	31	0.4	16.7	19	0.1	16.5	Sept. 7	0.0	15.8
20	0.6	16.1	Apr. 10	0.3	16.7	29	0.2	16.4	17	-0.1	15.7
30	0.6	16.2	20	0.2	16.7	July 9	0.2	16.3	..	..	..
Feb. 9	-0.6	16.3	30	-0.2	16.7	19	+0.2	16.2	Dec. 2	-0.8	15.7
19	0.6	16.4	May 10	-0.1	16.7	29	0.2	16.1	12	0.9	15.8
Mar. 1	0.6	16.5	20	0.0	16.7	Aug. 8	0.1	16.0	22	1.0	15.8
11	-0.5	16.5	30	0.0	16.6	18	+0.1	16.0	32	-1.0	15.9

PART VI

MISCELLANEOUS TABLES

LOCAL CIVIL TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time.

To obtain the standard time at any station, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

For sunrise in southern latitudes, see page 460.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date														
Jan.	0	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	5	5 59	6 17	6 35	6 56	7 08	7 22	7 38	7 59	8 08	8 19	8 32	8 46	9 03
	10	6 02	6 18	6 36	6 57	7 09	7 22	7 38	7 58	8 08	8 18	8 30	8 44	9 00
	15	6 04	6 20	6 37	6 57	7 09	7 22	7 37	7 56	8 05	8 15	8 27	8 40	8 55
	20	6 06	6 21	6 38	6 57	7 08	7 20	7 35	7 53	8 02	8 11	8 22	8 34	8 48
Feb.	25	6 07	6 22	6 38	6 56	7 06	7 18	7 32	7 49	7 57	8 06	8 16	8 27	8 40
	30	6 09	6 23	6 37	6 54	7 04	7 15	7 28	7 43	7 51	7 59	8 08	8 19	8 30
	4	6 10	6 23	6 36	6 52	7 01	7 11	7 23	7 37	7 44	7 51	7 59	8 09	8 20
	9	6 10	6 22	6 35	6 49	6 57	7 06	7 17	7 30	7 36	7 43	7 50	7 58	8 08
	14	6 11	6 21	6 33	6 45	6 53	7 01	7 10	7 22	7 27	7 33	7 40	7 47	7 55
Mar.	19	6 11	6 20	6 30	6 41	6 48	6 55	7 03	7 13	7 18	7 23	7 29	7 35	7 42
	24	6 11	6 19	6 27	6 37	6 42	6 48	6 56	7 04	7 08	7 12	7 17	7 22	7 28
	1	6 10	6 17	6 24	6 32	6 36	6 42	6 47	6 55	6 58	7 01	7 05	7 10	7 14
	6	6 09	6 15	6 20	6 27	6 30	6 34	6 39	6 45	6 47	6 50	6 53	6 56	7 00
	11	6 08	6 12	6 16	6 21	6 24	6 27	6 30	6 34	6 36	6 38	6 40	6 43	6 45
Apr.	16	6 07	6 10	6 12	6 15	6 17	6 19	6 21	6 24	6 25	6 26	6 27	6 29	6 30
	21	6 06	6 07	6 08	6 09	6 10	6 11	6 12	6 13	6 13	6 14	6 14	6 15	6 15
	26	6 04	6 04	6 04	6 03	6 03	6 03	6 02	6 02	6 02	6 01	6 01	6 00	6 00
	31	6 03	6 01	5 59	5 57	5 56	5 55	5 53	5 51	5 50	5 49	5 48	5 47	5 45
	5	6 01	5 58	5 55	5 51	5 49	5 47	5 44	5 40	5 38	5 37	5 35	5 32	5 30
	10	5 59	5 55	5 51	5 45	5 42	5 39	5 34	5 29	5 27	5 24	5 21	5 18	5 15
	15	5 58	5 53	5 47	5 39	5 35	5 31	5 25	5 19	5 16	5 12	5 09	5 04	5 00
	20	5 57	5 50	5 42	5 34	5 29	5 23	5 16	5 08	5 05	5 00	4 56	4 51	4 45
	25	5 56	5 47	5 39	5 28	5 23	5 16	5 08	4 58	4 54	4 49	4 43	4 37	4 30
	30	5 55	5 45	5 35	5 23	5 16	5 09	5 00	4 48	4 43	4 38	4 31	4 24	4 16
	5	5 54	5 43	5 32	5 19	5 11	5 02	4 52	4 39	4 33	4 27	4 19	4 11	4 02

BEGINNING OF MORNING TWILIGHT

Jan.	0	4 44	5 01	5 15	5 30	5 37	5 45	5 51	6 00	6 02	6 06	6 10	6 14	6 18
	10	4 49	5 05	5 19	5 32	5 39	5 46	5 53	6 00	6 02	6 05	6 08	6 12	6 15
	20	4 54	5 08	5 21	5 32	5 38	5 44	5 49	5 55	5 57	6 00	6 02	6 04	6 07
	30	4 58	5 10	5 21	5 30	5 34	5 39	5 42	5 47	5 47	5 49	5 50	5 52	5 53
Feb.	9	5 00	5 10	5 18	5 25	5 27	5 30	5 32	5 34	5 34	5 34	5 35	5 34	5 34
Mar.	19	5 01	5 08	5 14	5 18	5 18	5 19	5 19	5 18	5 17	5 16	5 15	5 13	5 11
	1	5 00	5 05	5 08	5 08	5 08	5 06	5 03	4 59	4 57	4 54	4 51	4 48	4 44
	11	4 58	5 00	5 00	4 58	4 54	4 50	4 45	4 38	4 34	4 29	4 25	4 20	4 12
	21	4 55	4 55	4 52	4 45	4 39	4 33	4 25	4 14	4 09	4 03	3 56	3 46	3 37
	31	4 52	4 49	4 42	4 32	4 24	4 16	4 04	3 49	3 42	3 33	3 22	3 11	2 57
Apr.	10	4 49	4 42	4 32	4 19	4 09	3 57	3 42	3 22	3 12	3 01	2 46	2 29	2 08
	20	4 46	4 36	4 23	4 05	3 54	3 39	3 19	2 54	2 40	2 24	2 04	1 37	0 52
	30	4 43	4 31	4 14	3 54	3 39	3 20	2 57	2 24	2 05	1 42	1 07	...	...

Twilight lasts all night at latitude +60°, Apr. 22-Aug. 22; +58°, Apr. 28-Aug. 15; +56°, May 5-Aug. 9; +54°, May 12-Aug. 1; +52°, May 20-July 24; +50°, June 1-July 12.

LOCAL CIVIL TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, subtract twelve hours and mark the result P. M.

To obtain the standard time at any station, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

For sunset in southern latitudes, see page 460.

Date	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	0	18 07	17 50	17 31	17 10	16 58	16 44	16 28	16 08	15 58	15 47	15 35	15 20	15 03
	5	18 09	17 52	17 34	17 14	17 02	16 49	16 33	16 13	16 03	15 53	15 41	15 27	15 11
	10	18 11	17 55	17 38	17 18	17 07	16 54	16 38	16 19	16 10	16 00	15 49	15 36	15 20
	15	18 13	17 58	17 41	17 22	17 11	16 59	16 44	16 26	16 18	16 08	15 57	15 45	15 31
Feb.	20	18 15	18 00	17 44	17 27	17 16	17 04	16 50	16 34	16 26	16 17	16 07	15 56	15 43
	25	18 16	18 02	17 47	17 31	17 21	17 10	16 57	16 42	16 34	16 26	16 17	16 07	15 55
	30	18 17	18 04	17 51	17 35	17 26	17 16	17 04	16 50	16 43	16 36	16 28	16 19	16 08
	4	18 17	18 06	17 53	17 39	17 31	17 22	17 12	16 59	16 53	16 46	16 39	16 30	16 21
Mar.	9	18 18	18 07	17 56	17 44	17 36	17 28	17 19	17 07	17 02	16 56	16 50	16 42	16 34
	14	18 18	18 08	17 59	17 48	17 41	17 34	17 26	17 16	17 11	17 06	17 01	16 54	16 47
	19	18 17	18 09	18 01	17 52	17 46	17 40	17 33	17 24	17 21	17 16	17 12	17 06	17 00
	24	18 17	18 10	18 03	17 55	17 51	17 46	17 40	17 33	17 30	17 26	17 22	17 18	17 13
Apr.	1	18 16	18 11	18 05	17 59	17 55	17 51	17 47	17 41	17 39	17 36	17 33	17 30	17 26
	6	18 15	18 11	18 07	18 02	18 00	17 57	17 53	17 50	17 48	17 46	17 44	17 41	17 39
	11	18 13	18 11	18 08	18 05	18 04	18 02	18 00	17 58	17 57	17 55	17 54	17 53	17 51
	16	18 12	18 11	18 10	18 09	18 08	18 07	18 07	18 06	18 05	18 05	18 05	18 04	18 04
	21	18 11	18 11	18 11	18 12	18 12	18 13	18 13	18 14	18 14	18 14	18 15	18 15	18 16
	26	18 09	18 11	18 13	18 15	18 16	18 18	18 19	18 22	18 23	18 24	18 25	18 26	18 28
	31	18 08	18 11	18 14	18 18	18 20	18 23	18 26	18 30	18 31	18 33	18 35	18 38	18 40
	5	18 06	18 11	18 15	18 21	18 24	18 28	18 32	18 37	18 40	18 42	18 45	18 49	18 52
	10	18 05	18 11	18 17	18 24	18 28	18 33	18 38	18 45	18 48	18 52	18 56	19 00	19 05
	15	18 03	18 10	18 18	18 27	18 32	18 38	18 45	18 53	18 57	19 01	19 06	19 11	19 17
	20	18 02	18 11	18 20	18 30	18 36	18 43	18 51	19 01	19 05	19 10	19 16	19 22	19 29
	25	18 01	18 11	18 21	18 33	18 40	18 48	18 57	19 09	19 14	19 20	19 26	19 33	19 42
	30	18 01	18 11	18 23	18 36	18 44	18 53	19 04	19 16	19 22	19 29	19 36	19 45	19 54

ENDING OF EVENING TWILIGHT

Jan.	0	19 22	19 05	18 50	18 35	18 29	18 21	18 14	18 07	18 03	18 00	17 56	17 52	17 48
	10	19 25	19 10	18 56	18 43	18 37	18 30	18 23	18 16	18 13	18 10	18 08	18 04	18 00
	20	19 28	19 14	19 01	18 50	18 44	18 39	18 33	18 29	18 27	18 24	18 22	18 19	18 17
	30	19 29	19 17	19 07	18 57	18 53	18 49	18 45	18 42	18 41	18 40	18 39	18 38	18 36
Feb.	9	19 29	19 19	19 11	19 05	19 02	19 00	18 59	18 57	18 57	18 57	18 57	18 56	18 57
Mar.	19	19 27	19 20	19 15	19 12	19 11	19 11	19 11	19 12	19 14	19 15	19 17	19 18	19 20
	1	19 25	19 21	19 18	19 19	19 19	19 21	19 25	19 29	19 31	19 34	19 37	19 41	19 45
	11	19 22	19 21	19 21	19 24	19 28	19 32	19 38	19 46	19 50	19 54	19 59	20 06	20 12
	21	19 20	19 21	19 24	19 32	19 37	19 44	19 52	20 04	20 10	20 16	20 24	20 32	20 43
Apr.	31	19 17	19 21	19 28	19 39	19 46	19 56	20 08	20 24	20 31	20 40	20 50	21 03	21 18
	10	19 14	19 22	19 32	19 46	19 56	20 08	20 23	20 44	20 55	21 07	21 22	21 40	22 03
	20	19 12	19 23	19 36	19 54	20 06	20 22	20 41	21 08	21 22	21 39	22 00	22 29	23 23
	30	19 12	19 24	19 41	20 03	20 18	20 36	21 01	21 34	21 54	22 19	22 57	...	...

Twilight lasts all night at latitude +60°, Apr. 22-Aug. 22; +58°, Apr. 28-Aug. 15; +56°, May 5-Aug. 9; +54°, May 12-Aug. 1; +52°, May 20-July 24; +50°, June 1-July 12.

LOCAL CIVIL TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time.

To obtain the standard time at any station, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

For sunrise in southern latitudes, see page 460.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date														
Apr.	30	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
		5 54	5 43	5 32	5 19	5 11	5 02	4 52	4 39	4 33	4 27	4 19	4 11	4 02
	May 5	5 53	5 41	5 29	5 14	5 06	4 56	4 44	4 30	4 24	4 17	4 08	3 59	3 49
	10	5 53	5 40	5 26	5 10	5 01	4 50	4 38	4 22	4 15	4 07	3 58	3 48	3 36
	15	5 53	5 39	5 24	5 07	4 57	4 45	4 32	4 15	4 07	3 58	3 48	3 37	3 24
May	20	5 53	5 38	5 22	5 04	4 53	4 41	4 26	4 08	4 00	3 50	3 39	3 27	3 12
	25	5 53	5 38	5 21	5 02	4 50	4 37	4 22	4 02	3 53	3 43	3 31	3 18	3 02
	30	5 54	5 38	5 20	5 00	4 48	4 34	4 18	3 58	3 48	3 37	3 25	3 10	2 53
	June 4	5 54	5 38	5 20	4 59	4 46	4 32	4 15	3 54	3 44	3 33	3 19	3 04	2 46
	9	5 55	5 38	5 20	4 58	4 46	4 31	4 13	3 52	3 41	3 29	3 16	3 00	2 40
June	14	5 56	5 39	5 20	4 58	4 45	4 30	4 13	3 50	3 39	3 27	3 13	2 57	2 37
	19	5 57	5 40	5 21	4 59	4 46	4 31	4 13	3 50	3 39	3 27	3 13	2 56	2 35
	24	5 59	5 41	5 22	5 00	4 47	4 32	4 14	3 51	3 40	3 28	3 14	2 57	2 36
	29	6 00	5 42	5 23	5 01	4 49	4 34	4 16	3 53	3 42	3 30	3 16	3 00	2 40
	July 4	6 01	5 43	5 25	5 03	4 51	4 36	4 18	3 57	3 46	3 34	3 20	3 04	2 45
July	9	6 01	5 45	5 27	5 06	4 53	4 39	4 22	4 01	3 50	3 39	3 26	3 10	2 52
	14	6 02	5 46	5 28	5 08	4 56	4 42	4 26	4 06	3 56	3 45	3 32	3 18	3 00
	19	6 03	5 47	5 30	5 11	4 59	4 46	4 31	4 11	4 02	3 52	3 40	3 26	3 10
	24	6 03	5 48	5 32	5 14	5 03	4 51	4 36	4 18	4 09	3 59	3 48	3 36	3 21
	29	6 03	5 49	5 34	5 17	5 07	4 55	4 41	4 24	4 16	4 07	3 57	3 46	3 32
Aug.	3	6 03	5 50	5 36	5 20	5 10	4 59	4 47	4 31	4 24	4 16	4 06	3 56	3 44
	8	6 02	5 50	5 38	5 23	5 14	5 04	4 53	4 38	4 32	4 24	4 16	4 07	3 56
	13	6 02	5 51	5 39	5 26	5 18	5 09	4 59	4 46	4 40	4 33	4 26	4 17	4 08
	18	6 01	5 51	5 41	5 29	5 22	5 14	5 04	4 53	4 48	4 42	4 36	4 28	4 20
	23	5 59	5 51	5 42	5 32	5 26	5 19	5 10	5 01	4 56	4 51	4 45	4 39	4 32
	28	5 58	5 51	5 43	5 34	5 29	5 23	5 16	5 08	5 04	5 00	4 55	4 50	4 44

BEGINNING OF MORNING TWILIGHT

Apr.	30	4 43	4 31	4 14	3 54	3 39	3 20	2 57	2 24	2 05	1 42	1 07	....	....
May	10	4 41	4 26	4 08	3 42	3 25	3 04	2 35	1 52	1 25	0 39	....	....	....
	20	4 40	4 23	4 02	3 33	3 14	2 49	2 15	1 16	0 19	....	....	....	....
	30	4 40	4 21	3 58	3 26	3 04	2 37	1 58	0 29	....	....	....	....	....
June	9	4 40	4 21	3 56	3 22	3 00	2 30	1 45	....	....	....	....	....	....
	19	4 42	4 22	3 57	3 22	2 59	2 28	1 40	....	....	....	....	....	....
	29	4 44	4 24	3 59	3 25	3 01	2 30	1 43	....	....	....	....	....	....
July	9	4 46	4 27	4 03	3 30	3 08	2 38	1 55	....	....	....	....	....	....
	19	4 48	4 31	4 08	3 37	3 17	2 50	2 12	1 00	....	....	....	....	....
	29	4 50	4 34	4 14	3 45	3 27	3 03	2 31	1 40	1 02	....	....	....	....
Aug.	8	4 50	4 36	4 18	3 54	3 38	3 17	2 50	2 12	1 49	1 16	....	....	....
	18	4 50	4 39	4 23	4 03	3 49	3 32	3 10	2 40	2 23	2 02	1 36	0 50	....
	28	4 48	4 40	4 28	4 11	3 59	3 45	3 27	3 04	2 52	2 37	2 19	1 57	1 25

Twilight lasts all night at latitude +60°, Apr. 22-Aug. 22; +58°, Apr. 28-Aug. 15; +56°, May 5-Aug. 9; +54°, May 12-Aug. 1; +52°, May 20-July 24; +50°, June 1-July 12.

LOCAL CIVIL TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, subtract twelve hours and mark the result P. M.

To obtain the standard time at any station, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

For sunset in southern latitudes, see page 460.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date														
Apr. May	30	h m 18 01	h m 18 11	h m 18 23	h m 18 36	h m 18 44	h m 18 53	h m 19 04	h m 19 16	h m 19 22	h m 19 29	h m 19 36	h m 19 45	h m 19 54
	5	18 00	18 12	18 25	18 40	18 48	18 58	19 10	19 24	19 31	19 38	19 46	19 56	20 07
	10	18 00	18 13	18 27	18 43	18 52	19 03	19 16	19 31	19 39	19 47	19 56	20 07	20 19
	15	18 00	18 14	18 29	18 46	18 56	19 08	19 22	19 39	19 47	19 56	20 06	20 17	20 31
	20	18 00	18 15	18 31	18 49	19 00	19 12	19 27	19 46	19 54	20 04	20 15	20 28	20 42
June	25	18 00	18 16	18 33	18 52	19 04	19 17	19 33	19 52	20 01	20 12	20 23	20 37	20 53
	30	18 01	18 17	18 35	18 55	19 07	19 21	19 37	19 58	20 07	20 18	20 31	20 46	21 03
	4	18 02	18 19	18 37	18 58	19 10	19 24	19 41	20 03	20 13	20 24	20 38	20 53	21 12
	9	18 03	18 20	18 39	19 00	19 13	19 27	19 45	20 07	20 18	20 29	20 43	20 59	21 19
	14	18 04	18 21	18 40	19 02	19 15	19 30	19 48	20 10	20 21	20 33	20 47	21 04	21 24
July	19	18 05	18 22	18 41	19 03	19 17	19 32	19 50	20 12	20 23	20 35	20 50	21 07	21 27
	24	18 06	18 23	18 42	19 05	19 18	19 33	19 51	20 13	20 24	20 36	20 51	21 07	21 28
	29	18 07	18 24	18 43	19 05	19 18	19 33	19 51	20 13	20 24	20 36	20 50	21 06	21 27
	4	18 08	18 25	18 44	19 05	19 18	19 32	19 50	20 12	20 22	20 34	20 48	21 03	21 23
	9	18 09	18 25	18 43	19 04	19 17	19 31	19 48	20 09	20 19	20 30	20 44	20 59	21 17
Aug.	14	18 09	18 26	18 43	19 03	19 15	19 29	19 45	20 05	20 15	20 26	20 38	20 52	21 10
	19	18 10	18 25	18 42	19 01	19 13	19 26	19 41	20 00	20 09	20 20	20 31	20 45	21 01
	24	18 10	18 25	18 40	18 59	19 09	19 22	19 36	19 54	20 03	20 12	20 23	20 36	20 50
	29	18 10	18 24	18 39	18 56	19 06	19 17	19 31	19 48	19 56	20 04	20 14	20 26	20 39
	3	18 10	18 22	18 36	18 52	19 01	19 12	19 25	19 40	19 47	19 55	20 05	20 15	20 27
	8	18 09	18 21	18 33	18 48	18 57	19 06	19 18	19 32	19 38	19 46	19 54	20 03	20 14
	13	18 08	18 19	18 30	18 44	18 51	19 00	19 10	19 23	19 29	19 35	19 43	19 51	20 00
	18	18 07	18 17	18 27	18 39	18 46	18 53	19 02	19 14	19 19	19 24	19 31	19 38	19 46
	23	18 06	18 14	18 23	18 33	18 39	18 46	18 54	19 04	19 08	19 13	19 19	19 25	19 32
	28	18 05	18 12	18 19	18 28	18 33	18 39	18 45	18 53	18 57	19 01	19 06	19 11	19 17

ENDING OF EVENING TWILIGHT

Apr.	30	19 12	19 24	19 41	20 03	20 18	20 36	21 01	21 34	21 54	22 19	22 57	...	...
May	10	19 12	19 27	19 46	20 12	20 29	20 51	21 21	22 05	22 34	23 26	...	...	...
	20	19 13	19 31	19 52	20 21	20 41	21 05	21 40	22 42	...	...	...	...	...
	30	19 15	19 34	19 58	20 29	20 51	21 19	21 59	23 35	...	...	...	...	...
June	9	19 18	19 37	20 03	20 36	20 59	21 29	22 15	...	...	...	...	...	...
July	19	19 20	19 40	20 05	20 40	21 04	21 35	22 23	...	...	...	...	...	...
	29	19 22	19 42	20 07	20 41	21 05	21 36	22 23	...	...	...	...	...	...
	9	19 24	19 42	20 06	20 39	21 02	21 31	22 13	...	...	...	...	...	...
	19	19 24	19 41	20 04	20 34	20 55	21 21	21 58	23 07	...	...	...	...	...
Aug.	29	19 23	19 39	19 59	20 26	20 44	21 07	21 39	22 29	23 04	...	...	...	...
	8	19 21	19 35	19 51	20 16	20 32	20 51	21 18	21 56	22 17	22 49	...	...	...
	18	19 18	19 29	19 44	20 04	20 18	20 33	20 55	21 25	21 41	22 00	22 26	23 07	...
	28	19 15	19 23	19 34	19 51	20 02	20 16	20 32	20 55	21 07	21 21	21 38	22 00	22 29

Twilight lasts all night at latitude +60°, Apr. 22-Aug. 22; +58°, Apr. 28-Aug. 15; +56°, May 5-Aug. 9; +54°, May 12-Aug. 1; +52°, May 20-July 24; +50°, June 1-July 12.

LOCAL CIVIL TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time.

To obtain the standard time at any station, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

For sunrise in southern latitudes, see page 460.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date														
Aug.	28	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
		5 58	5 51	5 43	5 34	5 29	5 23	5 16	5 08	5 04	5 00	4 55	4 50	4 44
	Sept. 2	5 56	5 51	5 44	5 37	5 33	5 28	5 22	5 16	5 12	5 09	5 05	5 01	4 56
	7	5 55	5 50	5 45	5 40	5 37	5 33	5 28	5 23	5 21	5 18	5 15	5 11	5 08
	12	5 53	5 50	5 47	5 43	5 40	5 37	5 34	5 30	5 29	5 27	5 25	5 22	5 19
Oct.	17	5 51	5 50	5 48	5 45	5 44	5 42	5 40	5 38	5 37	5 36	5 34	5 33	5 31
	22	5 50	5 49	5 49	5 48	5 47	5 47	5 46	5 45	5 45	5 45	5 44	5 43	5 43
	27	5 48	5 49	5 50	5 51	5 51	5 52	5 52	5 53	5 53	5 54	5 54	5 54	5 55
	2	5 46	5 49	5 51	5 54	5 55	5 57	5 59	6 01	6 02	6 03	6 04	6 05	6 07
	7	5 45	5 48	5 52	5 56	5 59	6 02	6 05	6 08	6 10	6 12	6 14	6 16	6 19
Nov.	12	5 43	5 48	5 54	6 00	6 03	6 07	6 11	6 16	6 19	6 21	6 24	6 27	6 31
	17	5 42	5 49	5 55	6 03	6 07	6 12	6 18	6 24	6 27	6 31	6 34	6 38	6 43
	22	5 41	5 49	5 57	6 06	6 11	6 17	6 24	6 32	6 36	6 40	6 45	6 50	6 55
	27	5 41	5 49	5 59	6 10	6 16	6 23	6 31	6 41	6 45	6 50	6 55	7 01	7 08
	1	5 40	5 50	6 01	6 13	6 20	6 28	6 38	6 49	6 54	7 00	7 06	7 13	7 21
Dec.	6	5 40	5 52	6 04	6 17	6 25	6 34	6 45	6 57	7 03	7 09	7 17	7 25	7 34
	11	5 40	5 53	6 06	6 21	6 30	6 40	6 51	7 05	7 12	7 19	7 27	7 36	7 47
	16	5 41	5 55	6 09	6 26	6 35	6 46	6 58	7 14	7 21	7 29	7 38	7 48	7 59
	21	5 42	5 57	6 12	6 30	6 40	6 51	7 05	7 22	7 29	7 38	7 48	7 59	8 12
	26	5 44	5 59	6 15	6 34	6 45	6 57	7 11	7 29	7 37	7 47	7 57	8 09	8 23
	31	5 45	6 01	6 18	6 38	6 49	7 02	7 17	7 36	7 45	7 55	8 06	8 19	8 34
	6	5 47	6 04	6 21	6 42	6 53	7 07	7 23	7 42	7 52	8 02	8 14	8 28	8 44
	11	5 49	6 06	6 25	6 45	6 57	7 11	7 28	7 48	7 58	8 08	8 21	8 35	8 52
	16	5 52	6 09	6 28	6 49	7 01	7 15	7 32	7 52	8 02	8 13	8 26	8 40	8 58
	21	5 54	6 12	6 30	6 51	7 04	7 18	7 35	7 56	8 05	8 17	8 29	8 44	9 02
	26	5 57	6 14	6 33	6 54	7 06	7 20	7 37	7 58	8 08	8 19	8 31	8 46	9 04
	31	5 59	6 16	6 35	6 56	7 08	7 22	7 38	7 59	8 08	8 19	8 32	8 46	9 03
	36	6 02	6 18	6 36	6 57	7 09	7 22	7 38	7 58	8 08	8 18	8 30	8 44	9 00

BEGINNING OF MORNING TWILIGHT

Aug.	28	4 48	4 40	4 28	4 11	3 59	3 45	3 27	3 04	2 52	2 37	2 19	1 57	1 25
Sept.	7	4 46	4 41	4 31	4 18	4 09	3 58	3 44	3 26	3 16	3 05	2 53	2 37	2 18
	17	4 43	4 40	4 33	4 25	4 18	4 09	3 59	3 44	3 38	3 30	3 20	3 10	2 57
	27	4 39	4 39	4 37	4 30	4 27	4 21	4 13	4 03	3 58	3 52	3 45	3 38	3 28
Oct.	7	4 36	4 38	4 39	4 37	4 34	4 31	4 26	4 20	4 16	4 12	4 08	4 03	3 56
Nov.	17	4 32	4 39	4 41	4 42	4 42	4 41	4 38	4 36	4 34	4 31	4 28	4 25	4 22
	27	4 31	4 38	4 45	4 49	4 50	4 51	4 51	4 51	4 50	4 49	4 48	4 47	4 46
	6	4 29	4 39	4 48	4 56	4 58	5 01	5 03	5 05	5 06	5 06	5 06	5 07	5 07
	16	4 28	4 41	4 53	5 02	5 07	5 11	5 15	5 19	5 21	5 23	5 24	5 25	5 28
	26	4 29	4 44	4 58	5 09	5 15	5 21	5 26	5 33	5 35	5 37	5 39	5 42	5 45
Dec.	6	4 33	4 48	5 03	5 16	5 23	5 29	5 36	5 43	5 46	5 50	5 53	5 57	6 01
	16	4 36	4 54	5 08	5 23	5 29	5 37	5 44	5 53	5 55	5 59	6 03	6 08	6 12
	26	4 41	4 59	5 13	5 27	5 35	5 42	5 50	5 58	6 01	6 05	6 09	6 13	6 17
	36	4 46	5 03	5 18	5 32	5 38	5 45	5 52	6 00	6 03	6 07	6 10	6 14	6 18

LOCAL CIVIL TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, subtract twelve hours and mark the result P. M.

To obtain the standard time at any station, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

For sunset in southern latitudes, see page 460.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date														
Aug.	28	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	18 05	18 12	18 19	18 28	18 33	18 39	18 45	18 53	18 57	19 01	19 06	19 11	19 17
	7	18 03	18 09	18 15	18 22	18 26	18 31	18 36	18 43	18 46	18 50	18 53	18 57	19 02
	12	18 01	18 06	18 10	18 16	18 19	18 23	18 27	18 32	18 35	18 37	18 40	18 43	18 47
	17	18 00	18 03	18 06	18 10	18 12	18 15	18 18	18 21	18 23	18 25	18 27	18 29	18 32
Sept.	22	17 58	17 59	18 01	18 04	18 05	18 06	18 08	18 10	18 11	18 12	18 14	18 15	18 17
	27	17 56	17 56	17 57	17 57	17 58	17 58	17 59	17 59	18 00	18 00	18 00	18 01	18 01
	2	17 54	17 53	17 52	17 51	17 50	17 50	17 49	17 48	17 48	17 48	17 47	17 47	17 46
	7	17 53	17 50	17 48	17 45	17 43	17 42	17 40	17 37	17 36	17 35	17 34	17 33	17 31
	12	17 51	17 47	17 43	17 39	17 36	17 34	17 30	17 27	17 25	17 23	17 21	17 19	17 16
Oct.	17	17 50	17 45	17 39	17 33	17 30	17 26	17 21	17 16	17 14	17 11	17 08	17 05	17 01
	22	17 49	17 42	17 35	17 28	17 23	17 18	17 13	17 06	17 03	16 59	16 56	16 51	16 47
	27	17 48	17 40	17 32	17 23	17 17	17 11	17 04	16 56	16 52	16 48	16 43	16 38	16 33
	1	17 47	17 38	17 29	17 18	17 12	17 05	16 56	16 47	16 42	16 37	16 32	16 26	16 19
	6	17 47	17 37	17 26	17 13	17 06	16 58	16 49	16 38	16 33	16 27	16 20	16 13	16 05
Nov.	11	17 47	17 36	17 23	17 10	17 02	16 53	16 42	16 30	16 24	16 17	16 10	16 02	15 53
	16	17 48	17 35	17 22	17 06	16 58	16 48	16 36	16 22	16 16	16 08	16 00	15 51	15 41
	21	17 48	17 35	17 20	17 04	16 54	16 43	16 31	16 15	16 08	16 00	15 51	15 41	15 29
	26	17 49	17 35	17 19	17 02	16 52	16 40	16 26	16 10	16 02	15 53	15 43	15 32	15 19
	1	17 51	17 35	17 19	17 00	16 50	16 37	16 23	16 05	15 57	15 47	15 37	15 25	15 11
Dec.	6	17 53	17 36	17 19	17 00	16 49	16 35	16 20	16 01	15 53	15 43	15 31	15 18	15 03
	11	17 55	17 38	17 20	17 00	16 48	16 35	16 19	15 59	15 50	15 39	15 28	15 14	14 58
	16	17 57	17 40	17 22	17 01	16 49	16 35	16 18	15 58	15 49	15 38	15 25	15 11	14 54
	21	17 59	17 42	17 23	17 02	16 50	16 36	16 19	15 58	15 49	15 38	15 25	15 10	14 53
	26	18 02	17 44	17 26	17 04	16 52	16 38	16 21	16 00	15 50	15 39	15 26	15 12	14 54
	31	18 04	17 47	17 28	17 07	16 55	16 40	16 24	16 03	15 53	15 42	15 30	15 15	14 57
	36	18 07	17 49	17 31	17 10	16 58	16 44	16 28	16 07	15 58	15 47	15 34	15 20	15 03
		18 09	17 52	17 34	17 14	17 02	16 48	16 32	16 13	16 03	15 53	15 41	15 27	15 10

ENDING OF EVENING TWILIGHT

Aug.	28	19 15	19 23	19 34	19 51	20 02	20 16	20 32	20 55	21 07	21 21	21 38	22 00	22 29
	7	19 10	19 16	19 24	19 37	19 46	19 57	20 10	20 28	20 37	20 47	20 59	21 13	21 32
	17	19 07	19 09	19 14	19 24	19 30	19 38	19 48	20 01	20 08	20 16	20 25	20 35	20 48
	27	19 03	19 03	19 05	19 11	19 14	19 20	19 27	19 37	19 42	19 48	19 53	20 01	20 09
	7	19 00	18 57	18 56	18 58	19 00	19 04	19 07	19 14	19 17	19 21	19 25	19 30	19 35
Oct.	17	18 59	18 52	18 49	18 48	18 47	18 48	18 51	18 53	18 55	18 57	19 00	19 02	19 06
	27	18 57	18 49	18 43	18 38	18 37	18 36	18 35	18 36	18 35	18 36	18 37	18 38	18 40
	6	18 59	18 48	18 38	18 32	18 28	18 25	18 22	18 20	18 20	18 19	18 18	18 18	18 18
	16	19 01	18 48	18 36	18 27	18 22	18 17	18 13	18 08	18 07	18 05	18 03	18 01	17 59
	26	19 05	18 49	18 36	18 24	18 19	18 12	18 07	18 01	17 59	17 55	17 53	17 50	17 47
Nov.	6	19 10	18 53	18 38	18 25	18 18	18 12	18 05	17 57	17 54	17 50	17 48	17 44	17 40
	16	19 14	18 57	18 42	18 27	18 21	18 14	18 06	17 57	17 55	17 51	17 47	17 43	17 39
	26	19 19	19 02	18 47	18 32	18 26	18 18	18 11	18 02	17 59	17 55	17 52	17 48	17 43
	36	19 24	19 07	18 52	18 39	18 32	18 25	18 18	18 11	18 08	18 05	18 01	17 57	17 53

SUNRISE, SUNSET, AND TWILIGHT FOR SOUTHERN LATITUDES

In the case of a southern latitude, the time of sunrise, sunset, or beginning or ending of twilight is taken from the main table, with the corresponding northern latitude not for the given date but for a date about six months earlier or later, which is to be found in the following auxiliary table. The time thus obtained must be corrected by the quantity given in the following table on the same line with the given date.

Example.—May 5, 1958, in latitude -38° , required the times of sunrise, sunset, and beginning and ending of twilight.

The auxiliary table gives November 7 as the corresponding date, northern latitude, while the correction is $+13^m$.

	Beginning of Twilight	Sunrise	Sunset	Ending of Twilight
	h m	h m	h m	h m
Main table, Lat. $+38^{\circ}$ Nov. 7	5 01	6 31	16 56	18 25
Auxiliary table	+13	+13	+13	+13
Local civil time, May 5	5 14	6 44	17 09	18 38
	5 ^h 14 ^m A. M.	6 ^h 44 ^m A. M.	5 ^h 09 ^m P. M.	6 ^h 38 ^m P. M.

The periods during which twilight lasts all night in southern latitudes may be found by substituting for the northern latitudes given in the footnotes, pages 454–457, the corresponding southern latitudes, and for the dates given in those footnotes, the corresponding dates taken from the auxiliary table.

Given Date	Corre- sponding Date, Northern Latitude	Correc- tion	Given Date	Corre- sponding Date, Northern Latitude	Correc- tion	Given Date	Corre- sponding Date, Northern Latitude	Correc- tion	Given Date	Corre- sponding Date, Northern Latitude	Correc- tion
Jan. 0	July 1	^m -1	Feb. 5	Aug. 9	+ 8	Mar. 13	Sept. 15	^m +14	Apr. 18	Oct. 21	^m +15
1	2	0	6	10	9	14	16	14	19	22	15
2	4	0	7	11	9	15	17	14	20	23	15
3	5	0	8	12	9	16	18	15	21	24	15
4	6	0	9	13	9	17	19	15	22	25	14
5	7	0	10	14	+10	18	20	+15	23	26	+14
6	8	+1	11	15	10	19	21	15	24	27	14
7	9	1	12	16	10	20	22	15	25	28	14
8	10	1	13	17	10	21	23	15	26	29	14
9	11	2	14	18	10	22	24	15	27	30	14
10	12	+2	15	19	+11	23	25	+15	28	31	+14
11	13	2	16	20	11	24	26	15	29	Nov. 1	14
12	14	2	17	21	11	25	27	15	30	2	14
13	15	3	18	22	11	26	28	15	May 1	3	14
14	16	3	19	23	11	27	29	15	2	4	13
15	17	+3	20	25	+12	28	Oct. 30	+15	3	5	+13
16	19	3	21	26	12	29	1	15	4	6	13
17	20	4	22	27	12	30	2	15	5	7	13
18	21	4	23	28	12	31	3	15	6	8	13
19	22	4	24	29	12	Apr. 1	5	15	7	9	13
20	23	+5	25	30	+12	2	6	+15	8	10	+13
21	24	5	26	31	13	3	7	15	9	11	12
22	25	5	27	Sept. 1	13	4	8	15	10	12	12
23	26	5	28	2	13	5	9	15	11	13	12
24	27	6	Mar. 1	3	13	6	10	15	12	14	12
25	28	+6	2	4	+13	7	10	+15	13	15	+12
26	29	6	3	5	13	8	11	15	14	16	12
27	30	6	4	6	13	9	12	15	15	17	11
28	31	7	5	7	13	10	13	15	16	17	11
29	Aug. 1	7	6	8	14	11	14	15	17	18	11
30	2	+7	7	9	+14	12	15	+15	18	19	+11
31	3	7	8	10	14	13	16	15	19	20	11
Feb. 1	5	8	9	11	14	14	17	15	20	21	11
2	6	8	10	12	14	15	18	15	21	22	10
3	7	8	11	13	14	16	19	15	22	23	10
4	8	+8	12	14	+14	17	20	+15	23	24	+10

SUNRISE, SUNSET, AND TWILIGHT FOR SOUTHERN LATITUDES

Given Date	Corresponding Date, Northern Latitude	Correc-tion	Given Date	Corresponding Date, Northern Latitude	Correc-tion	Given Date	Corresponding Date, Northern Latitude	Correc-tion	Given Date	Corresponding Date, Northern Latitude	Correc-tion
May 24	Nov. 25	^m +10	July 19	Jan. 16	^m -3	Sept. 13	Mar. 11	^m -14	Nov. 8	May 6	^m -13
25	26	10	20	17	4	14	12	14	9	7	13
26	27	9	21	18	4	15	13	14	10	8	13
27	28	9	22	19	4	16	14	14	11	9	12
28	29	9	23	20	5	17	15	14	12	10	12
29	30	+9	24	21	-5	18	16	-15	13	11	-12
30	Dec. 1	9	25	22	5	19	17	15	14	12	12
31	2	8	26	23	5	20	18	15	15	13	12
June 1	3	8	27	24	6	21	19	15	16	14	12
2	4	8	28	25	6	22	20	15	17	15	11
3	5	+8	29	26	-6	23	21	-15	18	17	-11
4	6	7	30	27	6	24	22	15	19	18	11
5	6	7	31	28	7	25	23	15	20	19	11
6	7	7	Aug. 1	29	7	26	24	15	21	20	11
7	8	7	2	30	7	27	25	15	22	21	10
8	9	+7	3	31	-7	28	26	-15	23	22	-10
9	10	6	4	Feb. 1	7	29	27	15	24	23	10
10	11	6	5	1	8	30	28	15	25	24	10
11	12	6	6	2	8	Oct. 1	29	15	26	25	10
12	13	6	7	3	8	2	30	15	27	26	9
13	14	+5	8	4	-8	3	31	-15	28	27	-9
14	15	5	9	5	8	4	Apr. 1	15	29	28	9
15	16	5	10	6	9	5	1	15	30	29	9
16	17	5	11	7	9	6	2	15	Dec. 1	30	9
17	18	4	12	8	9	7	3	15	2	31	8
18	19	+4	13	9	-9	8	4	-15	3	June 1	-8
19	20	4	14	10	10	9	5	15	4	2	8
20	21	4	15	11	10	10	7	15	5	3	8
21	22	3	16	12	10	11	8	15	6	5	7
22	22	3	17	13	10	12	9	15	7	6	7
23	23	+3	18	14	-10	13	10	-15	8	7	-7
24	24	3	19	15	11	14	11	15	9	8	7
25	25	3	20	16	11	15	12	15	10	9	6
26	26	2	21	17	11	16	13	15	11	10	6
27	27	2	22	18	11	17	14	15	12	11	6
28	28	+2	23	19	-11	18	15	-15	13	12	-6
29	29	1	24	19	11	19	16	15	14	13	5
30	30	1	25	20	12	20	17	15	15	14	5
July 1	Dec. 31	+1	26	21	12	21	18	15	16	15	5
2	Jan. 1	0	27	22	12	22	19	15	17	16	4
3	1	+1	28	23	-12	23	20	-15	18	17	-4
4	2	0	29	24	12	24	21	15	19	18	4
5	3	0	30	25	12	25	22	14	20	19	4
6	4	0	31	26	13	26	23	14	21	21	4
7	5	0	Sept. 1	27	13	27	24	14	22	22	3
8	6	-1	2	28	-13	28	25	-14	23	23	-3
9	7	1	3	Mar. 1	13	29	26	14	24	24	3
10	8	1	4	2	13	30	27	14	25	25	3
11	9	2	5	3	13	31	28	14	26	26	2
12	10	2	6	4	13	Nov. 1	29	14	27	27	-2
13	11	-2	7	5	-13	2	30	-14	28	28	-2
14	12	2	8	6	14	3	May 1	14	29	29	1
15	13	3	9	7	14	4	2	13	30	30	1
16	14	3	10	8	14	5	3	13	31	July 1	1
17	15	3	11	9	14	6	4	13	32	2	-1
18	16	-4	12	10	-14	7	5	-13			

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat. Date		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	0	13 34	13 24	13 13	13 01	12 54	12 46	12 37	12 26	12 21	12 15	12 09	12 02	11 54
	1	14 22	14 10	13 57	13 42	13 33	13 23	13 12	12 58	12 52	12 44	12 36	12 28	12 17
	2	15 13	14 59	14 44	14 27	14 17	14 06	13 52	13 36	13 29	13 20	13 11	13 00	12 48
	3	16 07	15 52	15 36	15 17	15 07	14 55	14 40	14 23	14 15	14 06	13 55	13 43	13 30
	4	17 02	16 47	16 31	16 13	16 03	15 50	15 36	15 18	15 10	15 01	14 51	14 39	14 25
	5	17 59	17 45	17 31	17 14	17 04	16 52	16 39	16 23	16 15	16 07	15 57	15 47	15 34
	6	18 56	18 44	18 32	18 17	18 09	17 59	17 48	17 35	17 28	17 21	17 13	17 05	16 54
	7	19 51	19 43	19 33	19 22	19 16	19 09	19 00	18 50	18 46	18 40	18 35	18 28	18 21
	8	20 46	20 40	20 34	20 28	20 24	20 19	20 14	20 08	20 05	20 02	19 58	19 55	19 50
	9	21 39	21 37	21 35	21 32	21 31	21 30	21 28	21 26	21 25	21 24	21 23	21 21	21 20
	10	22 31	22 33	22 34	22 37	22 38	22 39	22 41	22 43	22 44	22 45	22 46	22 47	22 49
	11	23 23	23 28	23 34	23 40	23 44	23 48	23 53	23 59	...	...	...	...	...
	12	...	...	...	...	...	...	...	...	0 02	0 05	0 09	0 12	0 17
	13	0 15	0 23	0 32	0 43	0 49	0 56	1 04	1 14	1 19	1 24	1 29	1 36	1 43
	14	1 08	1 19	1 31	1 45	1 53	2 03	2 14	2 27	2 33	2 40	2 48	2 56	3 06
	15	2 02	2 15	2 29	2 46	2 56	3 07	3 20	3 36	3 43	3 52	4 01	4 11	4 24
	16	2 56	3 11	3 26	3 44	3 55	4 07	4 21	4 39	4 47	4 56	5 07	5 19	5 32
	17	3 50	4 05	4 21	4 39	4 50	5 02	5 17	5 35	5 43	5 52	6 03	6 15	6 29
	18	4 43	4 57	5 13	5 30	5 40	5 52	6 06	6 23	6 31	6 39	6 49	7 00	7 13
	19	5 34	5 47	6 01	6 16	6 26	6 36	6 48	7 03	7 10	7 17	7 26	7 35	7 46
	20	6 23	6 34	6 45	6 58	7 06	7 15	7 25	7 37	7 42	7 48	7 55	8 03	8 12
	21	7 10	7 18	7 27	7 37	7 42	7 49	7 56	8 05	8 10	8 14	8 19	8 25	8 31
	22	7 54	8 00	8 05	8 12	8 16	8 20	8 25	8 31	8 34	8 37	8 40	8 44	8 48
	23	8 37	8 40	8 42	8 45	8 47	8 49	8 52	8 54	8 55	8 57	8 58	9 00	9 02
	24	9 19	9 19	9 18	9 18	9 18	9 17	9 17	9 17	9 16	9 16	9 16	9 16	9 15
	25	10 01	9 58	9 54	9 50	9 48	9 45	9 42	9 39	9 37	9 35	9 34	9 31	9 29
	26	10 44	10 37	10 31	10 23	10 19	10 14	10 09	10 02	9 59	9 56	9 52	9 48	9 44
	27	11 27	11 19	11 09	10 59	10 52	10 46	10 37	10 28	10 23	10 19	10 13	10 07	10 00
	28	12 13	12 02	11 50	11 37	11 29	11 20	11 09	10 57	10 51	10 45	10 38	10 30	10 21
	29	13 01	12 48	12 34	12 18	12 09	11 59	11 46	11 31	11 24	11 17	11 08	10 58	10 47
Feb.	30	13 52	13 38	13 23	13 05	12 55	12 43	12 29	12 13	12 05	11 56	11 46	11 35	11 22
	31	14 46	14 31	14 15	13 57	13 47	13 34	13 20	13 03	12 54	12 45	12 35	12 23	12 09
	1	15 42	15 28	15 12	14 55	14 44	14 32	14 19	14 02	13 54	13 45	13 35	13 23	13 10
	2	16 39	16 26	16 12	15 57	15 47	15 37	15 25	15 10	15 03	14 55	14 46	14 36	14 25
	3	17 36	17 25	17 14	17 02	16 54	16 46	16 36	16 24	16 19	16 12	16 06	15 58	15 49
	4	18 32	18 25	18 17	18 09	18 03	17 58	17 51	17 43	17 39	17 35	17 30	17 25	17 19
	5	19 28	19 24	19 20	19 16	19 13	19 10	19 07	19 03	19 01	18 59	18 57	18 54	18 52
	6	20 22	20 22	20 23	20 23	20 23	20 23	20 23	20 23	20 24	20 24	20 24	20 24	20 24
	7	21 16	21 20	21 24	21 29	21 32	21 35	21 39	21 43	21 45	21 47	21 50	21 53	21 56
	8	22 10	22 17	22 25	22 34	22 39	22 45	22 52	23 01	23 05	23 09	23 14	23 19	23 25
	9	23 04	23 14	23 25	23 38	23 46	23 54	...	...	...	...	...	...	...
	10	23 58	...	...	...	...	...	0 04	0 16	0 22	0 28	0 35	0 42	0 51
	11	...	0 11	0 25	0 40	0 49	1 00	1 12	1 27	1 34	1 42	1 50	2 00	2 12
	12	0 53	1 07	1 22	1 40	1 50	2 01	2 15	2 32	2 40	2 49	2 59	3 10	3 23
	13	1 46	2 01	2 17	2 35	2 46	2 58	3 12	3 30	3 38	3 48	3 58	4 10	4 24
	14	2 39	2 54	3 09	3 27	3 37	3 49	4 03	4 20	4 28	4 37	4 47	4 58	5 11
	15	3 30	3 43	3 58	4 14	4 23	4 34	4 47	5 02	5 09	5 17	5 26	5 36	5 48
	16	4 19	4 30	4 43	4 57	5 05	5 14	5 25	5 38	5 44	5 50	5 58	6 06	6 16

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat. Date		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Jan.	0	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	1	1 10	1 19	1 29	1 40	1 46	1 53	2 01	2 12	2 16	2 21	2 27	2 33	2 41
	2	1 57	2 08	2 20	2 34	2 42	2 51	3 02	3 15	3 21	3 28	3 36	3 44	3 54
	3	2 46	2 59	3 14	3 30	3 39	3 50	4 03	4 19	4 26	4 34	4 43	4 53	5 05
	4	3 38	3 53	4 09	4 26	4 37	4 49	5 03	5 20	5 28	5 37	5 47	5 59	6 13
	5	4 33	4 48	5 04	5 22	5 33	5 46	6 00	6 18	6 26	6 35	6 46	6 58	7 11
	6	5 29	5 44	5 59	6 17	6 27	6 39	6 52	7 09	7 17	7 26	7 35	7 46	7 59
	7	6 26	6 39	6 53	7 08	7 17	7 27	7 39	7 54	8 00	8 08	8 16	8 26	8 36
	8	7 22	7 33	7 44	7 56	8 03	8 11	8 21	8 32	8 37	8 43	8 50	8 57	9 05
	9	8 17	8 25	8 32	8 41	8 46	8 52	9 06	9 19	9 27	9 33	9 41	9 49	9 58
	10	9 11	9 15	9 19	9 23	9 26	9 29	9 32	9 36	9 37	9 39	9 41	9 44	9 47
	11	10 03	10 04	10 04	10 04	10 04	10 04	10 04	10 04	10 04	10 04	10 04	10 04	10 04
	12	10 55	10 52	10 48	10 44	10 41	10 39	10 35	10 32	10 30	10 28	10 26	10 23	10 21
	13	11 47	11 40	11 33	11 25	11 20	11 14	11 08	11 00	10 57	10 53	10 49	10 44	10 39
	14	12 40	12 30	12 19	12 07	12 00	11 52	11 43	11 32	11 27	11 21	11 15	11 08	11 00
	15	13 33	13 21	13 08	12 53	12 44	12 34	12 22	12 08	12 01	11 54	11 46	11 37	11 26
	16	14 28	14 13	13 58	13 41	13 31	13 19	13 06	12 49	12 42	12 33	12 23	12 13	12 00
	17	15 22	15 07	14 51	14 33	14 22	14 10	13 55	13 37	13 29	13 20	13 09	12 57	12 43
	18	16 16	16 01	15 45	15 27	15 16	15 04	14 50	14 32	14 24	14 14	14 04	13 52	13 38
	19	17 08	16 54	16 39	16 22	16 13	16 01	15 48	15 32	15 24	15 15	15 06	14 55	14 42
	20	17 58	17 46	17 33	17 19	17 10	17 00	16 49	16 35	16 28	16 21	16 13	16 04	15 53
	21	18 46	18 36	18 26	18 14	18 07	17 59	17 50	17 39	17 34	17 28	17 22	17 15	17 07
	22	19 31	19 24	19 17	19 09	19 04	18 58	18 52	18 44	18 40	18 36	18 32	18 27	18 21
	23	20 15	20 11	20 07	20 02	19 59	19 56	19 52	19 47	19 45	19 43	19 40	19 38	19 34
	24	20 58	20 56	20 55	20 54	20 53	20 52	20 51	20 50	20 50	20 49	20 48	20 48	20 47
	25	21 39	21 41	21 43	21 46	21 47	21 49	21 50	21 52	21 53	21 54	21 55	21 57	21 58
	26	22 21	22 26	22 31	22 37	22 41	22 45	22 49	22 54	22 57	23 00	23 02	23 06	23 10
	27	23 05	23 12	23 20	23 29	23 35	23 41	23 48	23 56	...	...	...	...	...
	28	23 49	23 59	...	...	...	...	...	...	0 00	0 05	0 10	0 15	0 21
	29	...	...	0 10	0 22	0 30	0 38	0 47	0 59	1 04	1 10	1 17	1 24	1 33
Feb.	30	0 36	0 48	1 01	1 16	1 25	1 35	1 47	2 01	2 08	2 15	2 23	2 33	2 43
	31	1 26	1 39	1 54	2 11	2 21	2 33	2 46	3 02	3 10	3 18	3 28	3 39	3 52
	1	2 18	2 33	2 48	3 07	3 17	3 29	3 43	4 01	4 09	4 18	4 28	4 40	4 54
	2	3 13	3 27	3 43	4 01	4 12	4 24	4 38	4 55	5 03	5 12	5 22	5 34	5 47
	3	4 09	4 23	4 37	4 54	5 04	5 15	5 28	5 43	5 51	5 59	6 08	6 18	6 30
	4	5 06	5 18	5 30	5 44	5 52	6 02	6 12	6 25	6 31	6 38	6 45	6 54	7 03
	5	6 03	6 12	6 21	6 32	6 38	6 45	6 53	7 02	7 07	7 11	7 17	7 23	7 29
	6	6 59	7 04	7 10	7 16	7 20	7 24	7 29	7 35	7 38	7 40	7 44	7 47	7 51
	7	7 54	7 56	7 57	7 59	8 01	8 02	8 03	8 05	8 06	8 07	8 08	8 09	8 10
	8	8 48	8 46	8 44	8 41	8 40	8 38	8 36	8 34	8 33	8 32	8 31	8 30	8 28
	9	9 42	9 36	9 30	9 23	9 20	9 15	9 10	9 04	9 01	8 58	8 55	8 51	8 47
	10	10 36	10 27	10 17	10 07	10 01	9 54	9 45	9 36	9 31	9 26	9 21	9 15	9 08
	11	11 30	11 18	11 06	10 52	10 44	10 35	10 24	10 11	10 05	9 58	9 51	9 42	9 33
	12	12 24	12 11	11 56	11 40	11 30	11 19	11 06	10 51	10 43	10 35	10 26	10 16	10 04
	13	13 18	13 04	12 48	12 30	12 20	12 08	11 54	11 37	11 28	11 19	11 09	10 58	10 44
	14	14 12	13 57	13 41	13 23	13 12	13 00	12 46	12 28	12 20	12 11	12 01	11 49	11 35
	15	15 04	14 50	14 35	14 17	14 07	13 56	13 42	13 25	13 18	13 09	12 59	12 48	12 35
	16	15 54	15 41	15 28	15 12	15 03	14 53	14 41	14 26	14 19	14 12	14 03	13 53	13 42
	17	16 42	16 31	16 20	16 07	16 00	15 51	15 41	15 29	15 24	15 17	15 10	15 03	14 54

MERIDIAN OF GREENWICH

To obtain standard time see directions on page 494.

Date \ Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Feb.	15	h m 3 30	h m 3 43	h m 3 58	h m 4 14	h m 4 23	h m 4 34	h m 4 47	h m 5 02	h m 5 09	h m 5 17	h m 5 26	h m 5 36	h m 5 48
	16	4 19	4 30	4 43	4 57	5 05	5 14	5 25	5 38	5 44	5 50	5 58	6 06	6 16
	17	5 06	5 15	5 25	5 36	5 42	5 49	5 58	6 08	6 13	6 18	6 24	6 30	6 37
	18	5 51	5 57	6 04	6 12	6 17	6 22	6 28	6 35	6 38	6 42	6 46	6 50	6 55
	19	6 34	6 38	6 42	6 46	6 49	6 52	6 55	6 59	7 01	7 03	7 05	7 07	7 10
	20	7 17	7 17	7 18	7 19	7 20	7 20	7 21	7 22	7 22	7 23	7 23	7 24	7 24
	21	7 59	7 56	7 54	7 51	7 50	7 48	7 46	7 44	7 43	7 42	7 41	7 39	7 38
	22	8 41	8 36	8 30	8 24	8 21	8 17	8 13	8 07	8 05	8 02	7 59	7 56	7 52
	23	9 24	9 16	9 08	8 59	8 53	8 47	8 40	8 32	8 28	8 24	8 19	8 14	8 08
	24	10 08	9 58	9 47	9 35	9 28	9 20	9 11	8 59	8 54	8 49	8 42	8 35	8 27
	25	10 55	10 42	10 29	10 15	10 06	9 56	9 45	9 31	9 25	9 18	9 10	9 01	8 51
	26	11 43	11 29	11 15	10 58	10 48	10 37	10 24	10 08	10 01	9 53	9 44	9 33	9 21
Mar.	27	12 34	12 20	12 04	11 46	11 36	11 24	11 10	10 53	10 45	10 36	10 26	10 15	10 02
	28	13 27	13 13	12 57	12 39	12 29	12 17	12 03	11 46	11 38	11 29	11 19	11 07	10 54
	1	14 22	14 08	13 54	13 37	13 27	13 16	13 03	12 48	12 40	12 32	12 22	12 12	12 00
	2	15 18	15 06	14 54	14 39	14 31	14 21	14 10	13 57	13 51	13 44	13 36	13 27	13 17
	3	16 14	16 05	15 55	15 44	15 38	15 31	15 22	15 12	15 08	15 02	14 57	14 50	14 43
	4	17 10	17 04	16 58	16 51	16 47	16 43	16 38	16 31	16 29	16 25	16 22	16 18	16 14
	5	18 06	18 04	18 02	18 00	17 58	17 57	17 55	17 53	17 52	17 51	17 50	17 49	17 47
	6	19 01	19 03	19 05	19 08	19 09	19 11	19 13	19 15	19 16	19 17	19 19	19 20	19 22
	7	19 57	20 03	20 09	20 16	20 20	20 25	20 30	20 36	20 40	20 43	20 46	20 51	20 55
	8	20 53	21 02	21 12	21 23	21 30	21 37	21 46	21 56	22 01	22 06	22 12	22 19	22 26
	9	21 50	22 02	22 14	22 29	22 37	22 47	22 58	23 12	23 18	23 25	23 33	23 42	23 52
	10	22 46	23 00	23 14	23 31	23 41	23 52	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Apr.	11	23 42	23 56	.. ..	.. ..	.. ..	.. ..	0 05	0 21	0 29	0 37	0 47	0 58	1 10
	12	.. ..	.. ..	0 12	0 30	0 40	0 52	1 06	1 23	1 31	1 40	1 51	2 02	2 16
	13	0 35	0 50	1 05	1 23	1 34	1 45	1 59	2 17	2 25	2 34	2 44	2 55	3 08
	14	1 27	1 41	1 55	2 12	2 22	2 33	2 46	3 02	3 09	3 17	3 26	3 37	3 48
	15	2 17	2 29	2 41	2 56	3 04	3 14	3 25	3 39	3 45	3 52	4 00	4 09	4 19
	16	3 04	3 14	3 24	3 36	3 43	3 51	4 00	4 11	4 16	4 22	4 28	4 35	4 42
	17	3 49	3 56	4 04	4 13	4 18	4 24	4 31	4 39	4 42	4 46	4 51	4 56	5 00
	18	4 33	4 37	4 42	4 48	4 51	4 54	4 59	5 03	5 06	5 08	5 11	5 14	5 17
	19	5 15	5 17	5 19	5 21	5 22	5 23	5 25	5 27	5 28	5 29	5 30	5 31	5 32
	20	5 57	5 56	5 55	5 53	5 52	5 52	5 51	5 49	5 49	5 48	5 48	5 47	5 46
	21	6 39	6 35	6 31	6 26	6 23	6 20	6 17	6 12	6 10	6 08	6 06	6 03	6 00
	22	7 22	7 15	7 08	7 00	6 55	6 50	6 44	6 37	6 33	6 30	6 26	6 21	6 16
23	8 06	7 57	7 47	7 36	7 29	7 22	7 13	7 03	6 59	6 53	6 48	6 41	6 34	
24	8 52	8 40	8 28	8 14	8 06	7 57	7 46	7 33	7 28	7 21	7 14	7 05	6 56	
25	9 39	9 26	9 12	8 56	8 46	8 36	8 23	8 08	8 02	7 54	7 45	7 35	7 24	
26	10 28	10 14	9 59	9 41	9 31	9 20	9 06	8 50	8 42	8 33	8 24	8 13	8 00	
27	11 19	11 05	10 49	10 31	10 21	10 09	9 55	9 38	9 30	9 21	9 11	9 00	8 47	
28	12 12	11 58	11 43	11 26	11 16	11 04	10 51	10 35	10 27	10 18	10 09	9 58	9 45	
29	13 05	12 52	12 39	12 24	12 15	12 05	11 53	11 38	11 31	11 24	11 15	11 06	10 55	
30	13 59	13 49	13 38	13 25	13 18	13 10	13 00	12 48	12 43	12 37	12 30	12 22	12 14	
31	14 53	14 46	14 38	14 29	14 24	14 18	14 11	14 03	13 59	13 55	13 51	13 45	13 39	

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date \ Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Feb.	15	15 54	15 41	15 28	15 12	15 03	14 53	14 41	14 26	14 19	14 12	14 03	13 53	13 42
	16	16 42	16 31	16 20	16 07	16 00	15 51	15 41	15 29	15 24	15 17	15 10	15 03	14 54
	17	17 28	17 20	17 11	17 02	16 56	16 50	16 42	16 33	16 29	16 24	16 19	16 13	16 07
	18	18 12	18 07	18 01	17 55	17 51	17 47	17 42	17 36	17 34	17 31	17 27	17 24	17 20
	19	18 55	18 52	18 50	18 47	18 46	18 44	18 42	18 39	18 38	18 37	18 35	18 34	18 32
	20	19 37	19 37	19 38	19 39	19 40	19 40	19 41	19 42	19 42	19 42	19 43	19 43	19 44
	21	20 19	20 23	20 26	20 31	20 33	20 36	20 40	20 44	20 45	20 47	20 50	20 52	20 55
	22	21 01	21 08	21 15	21 22	21 27	21 32	21 38	21 45	21 49	21 52	21 56	22 01	22 06
	23	21 45	21 54	22 04	22 15	22 21	22 28	22 37	22 47	22 52	22 57	23 03	23 09	23 17
	24	22 30	22 42	22 54	23 08	23 16	23 25	23 35	23 48	23 54	...	...	...	...
	25	23 18	23 31	23 45	...	...	...	...	...	...	0 01	0 09	0 17	0 27
	26	...	...	...	0 01	0 10	0 21	0 33	0 49	0 56	1 04	1 13	1 23	1 34
	27	0 07	0 22	0 37	0 54	1 05	1 16	1 30	1 47	1 55	2 03	2 13	2 25	2 38
	28	0 59	1 14	1 30	1 48	1 58	2 10	2 24	2 41	2 49	2 58	3 09	3 20	3 34
Mar.	1	1 53	2 07	2 23	2 40	2 50	3 01	3 15	3 31	3 39	3 47	3 57	4 08	4 20
	2	2 48	3 01	3 15	3 30	3 39	3 49	4 01	4 15	4 22	4 29	4 38	4 47	4 57
	3	3 44	3 55	4 06	4 18	4 25	4 34	4 43	4 54	5 00	5 05	5 12	5 19	5 27
	4	4 40	4 48	4 55	5 04	5 09	5 15	5 21	5 29	5 33	5 37	5 41	5 46	5 51
	5	5 36	5 40	5 44	5 48	5 51	5 54	5 57	6 01	6 03	6 05	6 07	6 09	6 12
	6	6 32	6 32	6 32	6 32	6 32	6 32	6 32	6 32	6 32	6 31	6 31	6 31	6 31
	7	7 28	7 24	7 20	7 15	7 13	7 10	7 06	7 02	7 00	6 58	6 56	6 53	6 51
	8	8 24	8 17	8 09	8 00	7 55	7 49	7 42	7 34	7 31	7 27	7 22	7 17	7 12
	9	9 20	9 10	8 59	8 46	8 39	8 31	8 21	8 09	8 04	7 58	7 52	7 44	7 36
	10	10 17	10 04	9 50	9 35	9 26	9 16	9 04	8 49	8 42	8 35	8 26	8 17	8 06
	11	11 13	10 58	10 43	10 26	10 16	10 04	9 51	9 34	9 26	9 18	9 08	8 57	8 44
	12	12 07	11 53	11 37	11 19	11 09	10 57	10 42	10 25	10 17	10 08	9 58	9 46	9 32
	13	13 00	12 46	12 31	12 14	12 04	11 52	11 38	11 21	11 13	11 04	10 54	10 43	10 30
	14	13 51	13 38	13 24	13 09	12 59	12 49	12 36	12 21	12 14	12 06	11 57	11 47	11 35
	15	14 40	14 29	14 17	14 03	13 55	13 46	13 36	13 23	13 17	13 11	13 03	12 55	12 45
	16	15 26	15 17	15 08	14 57	14 51	14 44	14 36	14 26	14 21	14 16	14 11	14 04	13 57
	17	16 10	16 04	15 58	15 50	15 46	15 41	15 36	15 29	15 26	15 22	15 18	15 14	15 09
	18	16 53	16 50	16 47	16 43	16 40	16 38	16 35	16 31	16 30	16 28	16 26	16 23	16 21
	19	17 35	17 35	17 35	17 34	17 34	17 34	17 34	17 33	17 33	17 33	17 33	17 33	17 32
	20	18 17	18 20	18 23	18 26	18 28	18 30	18 32	18 35	18 37	18 38	18 40	18 41	18 43
	21	19 00	19 05	19 11	19 18	19 22	19 26	19 31	19 37	19 40	19 43	19 46	19 50	19 54
	22	19 43	19 51	20 00	20 10	20 15	20 22	20 29	20 39	20 43	20 47	20 53	20 58	21 05
	23	20 28	20 38	20 49	21 02	21 10	21 18	21 28	21 40	21 46	21 52	21 59	22 06	22 15
	24	21 14	21 27	21 40	21 55	22 04	22 14	22 26	22 40	22 47	22 54	23 03	23 12	23 23
	25	22 02	22 16	22 31	22 48	22 58	23 09	23 22	23 38	23 46	23 54	...	...	...
	26	22 52	23 07	23 22	23 40	23 51	...	...	...	...	...	0 04	0 15	0 27
	27	23 44	23 58	...	...	...	0 02	0 16	0 33	0 41	0 50	1 00	1 12	1 25
	28	...	...	0 14	0 31	0 41	0 53	1 07	1 23	1 31	1 40	1 50	2 01	2 14
	29	0 37	0 50	1 04	1 21	1 30	1 41	1 53	2 08	2 15	2 23	2 32	2 42	2 53
	30	1 31	1 42	1 54	2 08	2 16	2 25	2 35	2 48	2 54	3 00	3 08	3 16	3 25
	31	2 25	2 33	2 43	2 53	2 59	3 06	3 14	3 24	3 28	3 33	3 38	3 44	3 51
Apr.	1	3 19	3 25	3 30	3 37	3 41	3 45	3 50	3 56	3 59	4 02	4 05	4 09	4 13
	2	4 14	4 16	4 18	4 20	4 22	4 23	4 25	4 27	4 28	4 29	4 30	4 31	4 33

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr.	1	15 48	15 44	15 40	15 35	15 32	15 29	15 26	15 21	15 19	15 17	15 15	15 12	15 09
	2	16 43	16 43	16 42	16 42	16 42	16 42	16 42	16 42	16 42	16 42	16 42	16 42	16 42
	3	17 39	17 42	17 46	17 51	17 53	17 56	18 00	18 04	18 06	18 08	18 10	18 13	18 16
	4	18 36	18 43	18 51	19 00	19 05	19 11	19 17	19 26	19 30	19 34	19 39	19 44	19 50
	5	19 33	19 44	19 55	20 08	20 15	20 24	20 34	20 46	20 51	20 58	21 05	21 12	21 21
	6	20 32	20 45	20 58	21 14	21 23	21 34	21 46	22 01	22 08	22 16	22 25	22 35	22 46
	7	21 30	21 44	21 59	22 17	22 27	22 39	22 52	23 09	23 17	23 26	23 36	23 47	...
	8	22 27	22 41	22 57	23 15	23 25	23 37	23 51	...	...	...	...	...	0 00
	9	23 21	23 35	23 50	...	...	...	...	0 08	0 16	0 25	0 35	0 47	1 00
	10	...	...	...	0 07	0 17	0 28	0 41	0 58	1 05	1 14	1 23	1 34	1 46
	11	0 12	0 25	0 38	0 54	1 02	1 12	1 24	1 39	1 45	1 53	2 01	2 10	2 21
	12	1 01	1 11	1 23	1 35	1 43	1 51	2 01	2 13	2 18	2 24	2 31	2 38	2 47
	13	1 47	1 55	2 04	2 14	2 19	2 26	2 33	2 42	2 46	2 51	2 56	3 01	3 07
	14	2 31	2 37	2 42	2 49	2 53	2 57	3 02	3 08	3 10	3 13	3 17	3 20	3 24
	15	3 14	3 16	3 19	3 22	3 24	3 26	3 29	3 31	3 33	3 34	3 36	3 38	3 39
	16	3 56	3 55	3 55	3 55	3 55	3 55	3 54	3 54	3 54	3 54	3 54	3 54	3 54
	17	4 38	4 35	4 31	4 28	4 25	4 23	4 20	4 17	4 16	4 14	4 12	4 10	4 08
	18	5 20	5 15	5 08	5 01	4 57	4 53	4 47	4 41	4 38	4 35	4 31	4 28	4 23
	19	6 04	5 56	5 47	5 36	5 31	5 24	5 16	5 07	5 03	4 58	4 53	4 47	4 41
	20	6 49	6 39	6 27	6 14	6 06	5 58	5 48	5 36	5 30	5 24	5 18	5 10	5 01
	21	7 36	7 24	7 10	6 55	6 46	6 36	6 24	6 10	6 03	5 56	5 47	5 38	5 27
	22	8 25	8 11	7 57	7 39	7 30	7 18	7 05	6 49	6 42	6 33	6 24	6 13	6 01
	23	9 16	9 01	8 46	8 28	8 18	8 06	7 52	7 35	7 27	7 18	7 08	6 57	6 44
	24	10 07	9 53	9 38	9 20	9 10	8 59	8 45	8 28	8 21	8 12	8 02	7 51	7 38
	25	10 59	10 46	10 32	10 16	10 07	9 56	9 44	9 29	9 21	9 14	9 05	8 55	8 43
	26	11 51	11 40	11 28	11 15	11 07	10 58	10 47	10 35	10 29	10 22	10 15	10 06	9 57
	27	12 44	12 35	12 26	12 16	12 10	12 03	11 55	11 45	11 41	11 36	11 30	11 24	11 17
	28	13 36	13 31	13 25	13 18	13 15	13 10	13 05	12 59	12 57	12 54	12 50	12 46	12 42
	29	14 29	14 27	14 25	14 23	14 21	14 20	14 18	14 16	14 15	14 14	14 13	14 12	14 10
	30	15 22	15 24	15 26	15 28	15 30	15 31	15 33	15 35	15 36	15 37	15 38	15 39	15 41
May	1	16 17	16 23	16 29	16 35	16 39	16 44	16 49	16 55	16 58	17 01	17 04	17 08	17 13
	2	17 14	17 23	17 32	17 43	17 50	17 57	18 05	18 15	18 20	18 25	18 31	18 38	18 45
	3	18 13	18 24	18 37	18 51	18 59	19 09	19 20	19 34	19 40	19 47	19 55	20 04	20 14
	4	19 12	19 26	19 40	19 57	20 07	20 18	20 31	20 47	20 55	21 03	21 13	21 23	21 36
	5	20 11	20 25	20 41	20 59	21 09	21 21	21 35	21 53	22 01	22 10	22 20	22 31	22 45
	6	21 08	21 22	21 38	21 55	22 06	22 17	22 31	22 48	22 56	23 05	23 15	23 26	23 39
	7	22 03	22 16	22 30	22 46	22 56	23 06	23 19	23 34	23 41	23 49	23 58	...	...
	8	22 54	23 06	23 18	23 32	23 39	23 49	23 59	...	...	...	...	0 08	0 20
	9	23 42	23 51	...	...	...	...	...	0 12	0 18	0 25	0 32	0 40	0 50
	10	...	...	0 01	0 12	0 18	0 25	0 34	0 44	0 49	0 54	0 59	1 06	1 13
	11	0 28	0 34	0 41	0 49	0 53	0 58	1 04	1 11	1 14	1 18	1 22	1 26	1 31
	12	1 11	1 15	1 19	1 23	1 26	1 29	1 32	1 36	1 38	1 40	1 42	1 44	1 47
	13	1 54	1 54	1 55	1 56	1 57	1 57	1 58	1 59	1 59	2 00	2 00	2 01	2 01
	14	2 36	2 33	2 31	2 29	2 27	2 26	2 24	2 22	2 21	2 19	2 18	2 17	2 15
	15	3 18	3 13	3 08	3 02	2 58	2 55	2 50	2 45	2 43	2 40	2 37	2 34	2 30
	16	4 01	3 54	3 45	3 36	3 31	3 25	3 18	3 10	3 06	3 02	2 58	2 52	2 47
	17	4 46	4 36	4 25	4 13	4 06	3 58	3 49	3 38	3 33	3 27	3 21	3 14	3 06
	18	5 33	5 21	5 08	4 53	4 45	4 35	4 24	4 10	4 04	3 57	3 49	3 40	3 30

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr.	1	3 19	3 25	3 30	3 37	3 41	3 45	3 50	3 56	3 59	4 02	4 05	4 09	4 13
	2	4 14	4 16	4 18	4 20	4 22	4 23	4 25	4 27	4 28	4 29	4 30	4 31	4 33
	3	5 09	5 07	5 05	5 03	5 02	5 01	4 59	4 57	4 56	4 55	4 54	4 53	4 52
	4	6 05	6 00	5 54	5 48	5 44	5 40	5 35	5 29	5 26	5 23	5 20	5 16	5 12
	5	7 03	6 54	6 45	6 34	6 28	6 21	6 12	6 03	5 58	5 53	5 48	5 42	5 35
	6	8 01	7 49	7 37	7 23	7 15	7 05	6 55	6 41	6 35	6 29	6 21	6 13	6 03
	7	9 00	8 46	8 31	8 15	8 05	7 54	7 41	7 26	7 18	7 10	7 01	6 51	6 39
	8	9 57	9 43	9 27	9 09	8 59	8 47	8 33	8 16	8 08	7 59	7 49	7 38	7 24
	9	10 53	10 38	10 23	10 05	9 55	9 43	9 29	9 12	9 04	8 55	8 45	8 34	8 20
	10	11 46	11 32	11 18	11 02	10 52	10 41	10 28	10 12	10 05	9 57	9 47	9 37	9 25
	11	12 36	12 24	12 12	11 58	11 49	11 40	11 29	11 15	11 09	11 02	10 54	10 45	10 35
	12	13 23	13 14	13 04	12 52	12 46	12 38	12 29	12 18	12 13	12 08	12 01	11 54	11 47
	13	14 08	14 02	13 54	13 46	13 41	13 36	13 29	13 21	13 18	13 14	13 09	13 05	12 59
	14	14 52	14 48	14 43	14 38	14 35	14 32	14 28	14 24	14 22	14 19	14 17	14 14	14 11
	15	15 34	15 33	15 32	15 30	15 29	15 28	15 27	15 26	15 25	15 24	15 24	15 23	15 22
	16	16 16	16 18	16 19	16 22	16 23	16 24	16 26	16 27	16 28	16 29	16 30	16 31	16 33
	17	16 58	17 03	17 08	17 13	17 16	17 20	17 24	17 29	17 32	17 34	17 37	17 40	17 44
	18	17 41	17 49	17 56	18 05	18 10	18 16	18 23	18 31	18 35	18 39	18 44	18 49	18 55
	19	18 26	18 36	18 46	18 58	19 05	19 13	19 22	19 33	19 38	19 44	19 50	19 57	20 05
	20	19 12	19 24	19 36	19 51	19 59	20 09	20 20	20 34	20 40	20 47	20 55	21 04	21 14
	21	20 00	20 13	20 27	20 44	20 54	21 04	21 17	21 33	21 40	21 48	21 58	22 08	22 20
	22	20 49	21 04	21 19	21 36	21 47	21 58	22 12	22 29	22 37	22 46	22 55	23 07	23 20
	23	21 40	21 55	22 10	22 28	22 38	22 50	23 03	23 20	23 28	23 37	23 47	23 58	...
	24	22 32	22 46	23 00	23 17	23 27	23 38	23 51	...	...	...	...	...	0 11
	25	23 24	23 36	23 49	...	...	...	...	0 06	0 14	0 22	0 31	0 41	0 53
	26	...	...	...	0 04	0 12	0 22	0 33	0 47	0 53	1 00	1 08	1 17	1 27
	27	0 16	0 26	0 37	0 48	0 55	1 03	1 12	1 23	1 28	1 33	1 39	1 46	1 54
	28	1 08	1 16	1 23	1 31	1 36	1 41	1 48	1 55	1 59	2 02	2 06	2 11	2 16
	29	2 01	2 05	2 08	2 13	2 15	2 18	2 21	2 25	2 27	2 29	2 31	2 33	2 36
	30	2 54	2 54	2 54	2 54	2 54	2 54	2 54	2 54	2 54	2 54	2 54	2 54	2 54
May	1	3 48	3 45	3 41	3 37	3 34	3 31	3 28	3 24	3 22	3 20	3 18	3 16	3 13
	2	4 44	4 37	4 30	4 21	4 16	4 10	4 04	3 56	3 53	3 49	3 44	3 40	3 34
	3	5 42	5 32	5 21	5 08	5 01	4 53	4 43	4 32	4 27	4 21	4 15	4 07	3 59
	4	6 41	6 28	6 15	5 59	5 50	5 40	5 28	5 13	5 07	4 59	4 51	4 41	4 31
	5	7 40	7 26	7 11	6 53	6 43	6 32	6 18	6 02	5 54	5 45	5 36	5 24	5 12
	6	8 38	8 24	8 08	7 50	7 40	7 28	7 14	6 57	6 48	6 39	6 29	6 18	6 04
	7	9 35	9 21	9 06	8 49	8 39	8 27	8 14	7 57	7 49	7 41	7 31	7 20	7 07
	8	10 28	10 15	10 02	9 47	9 38	9 27	9 15	9 01	8 54	8 46	8 38	8 28	8 17
	9	11 17	11 07	10 56	10 43	10 36	10 28	10 18	10 06	10 00	9 54	9 47	9 39	9 30
	10	12 04	11 56	11 48	11 38	11 33	11 27	11 19	11 10	11 06	11 02	10 56	10 51	10 44
	11	12 49	12 44	12 38	12 32	12 29	12 24	12 20	12 14	12 11	12 08	12 05	12 01	11 57
	12	13 32	13 30	13 27	13 24	13 23	13 21	13 19	13 16	13 15	13 14	13 13	13 11	13 09
	13	14 14	14 15	14 15	14 16	14 17	14 17	14 18	14 18	14 19	14 19	14 19	14 20	14 20
	14	14 56	14 59	15 03	15 08	15 10	15 13	15 16	15 20	15 22	15 24	15 26	15 28	15 31
	15	15 39	15 45	15 52	15 59	16 04	16 09	16 15	16 22	16 25	16 29	16 33	16 37	16 42
	16	16 23	16 32	16 41	16 52	16 58	17 05	17 14	17 24	17 29	17 34	17 39	17 46	17 53
	17	17 08	17 20	17 31	17 45	17 53	18 02	18 13	18 26	18 32	18 38	18 46	18 54	19 04
	18	17 56	18 09	18 23	18 39	18 48	18 58	19 11	19 26	19 33	19 41	19 50	20 00	20 11

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date \ Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May	17	4 46	4 36	4 25	4 13	4 06	3 58	3 49	3 38	3 33	3 27	3 21	3 14	3 06
	18	5 33	5 21	5 08	4 53	4 45	4 35	4 24	4 10	4 04	3 57	3 49	3 40	3 30
	19	6 22	6 08	5 53	5 37	5 27	5 16	5 03	4 48	4 40	4 32	4 23	4 13	4 01
	20	7 12	6 58	6 42	6 25	6 14	6 03	5 49	5 32	5 24	5 15	5 05	4 54	4 41
	21	8 04	7 49	7 34	7 16	7 06	6 54	6 40	6 23	6 16	6 07	5 57	5 45	5 32
	22	8 56	8 42	8 28	8 11	8 02	7 51	7 38	7 22	7 14	7 06	6 57	6 46	6 34
	23	9 48	9 36	9 24	9 09	9 01	8 51	8 40	8 26	8 20	8 13	8 05	7 56	7 46
	24	10 40	10 31	10 21	10 09	10 02	9 55	9 46	9 35	9 30	9 25	9 18	9 12	9 04
	25	11 31	11 25	11 18	11 10	11 05	11 00	10 54	10 47	10 43	10 40	10 36	10 31	10 26
	26	12 23	12 19	12 16	12 12	12 10	12 07	12 04	12 01	11 59	11 57	11 55	11 53	11 51
	27	13 14	13 14	13 14	13 15	13 15	13 15	13 16	13 16	13 16	13 17	13 17	13 17	13 17
	28	14 06	14 10	14 14	14 19	14 22	14 25	14 29	14 33	14 35	14 37	14 40	14 43	14 46
	29	15 00	15 08	15 16	15 25	15 30	15 36	15 43	15 51	15 55	15 59	16 04	16 09	16 15
	30	15 57	16 07	16 18	16 31	16 38	16 47	16 56	17 08	17 14	17 20	17 27	17 35	17 44
	31	16 54	17 07	17 21	17 36	17 46	17 56	18 08	18 23	18 30	18 38	18 47	18 57	19 08
June	1	17 53	18 07	18 23	18 40	18 50	19 02	19 16	19 33	19 41	19 50	20 00	20 11	20 24
	2	18 52	19 06	19 22	19 40	19 50	20 02	20 17	20 34	20 42	20 51	21 01	21 13	21 26
	3	19 49	20 03	20 18	20 35	20 45	20 56	21 09	21 26	21 33	21 42	21 51	22 02	22 14
	4	20 43	20 55	21 08	21 24	21 32	21 42	21 54	22 08	22 15	22 22	22 30	22 39	22 50
	5	21 33	21 44	21 55	22 07	22 14	22 23	22 32	22 43	22 49	22 55	23 01	23 08	23 16
	6	22 21	22 29	22 37	22 46	22 52	22 58	23 05	23 13	23 17	23 21	23 26	23 31	23 37
	7	23 06	23 11	23 16	23 22	23 26	23 30	23 34	23 39	23 42	23 45	23 47	23 51	23 54
	8	23 50	23 52	23 54	23 56	23 58	23 59	0 01	0 03	0 04	0 05	0 07	0 08	0 09
	9	0 32	0 31	0 30	0 29	0 28	0 28	0 27	0 26	0 26	0 25	0 25	0 24	0 23
	10	1 14	1 10	1 06	1 02	0 59	0 56	0 53	0 49	0 47	0 45	0 43	0 41	0 38
	11	1 57	1 51	1 44	1 36	1 31	1 26	1 20	1 13	1 10	1 06	1 03	0 58	0 53
	12	2 41	2 32	2 22	2 11	2 05	1 58	1 50	1 40	1 35	1 30	1 25	1 18	1 11
	13	3 27	3 16	3 04	2 50	2 42	2 33	2 23	2 10	2 04	1 58	1 51	1 42	1 33
	14	4 15	4 02	3 48	3 32	3 23	3 13	3 00	2 45	2 38	2 31	2 22	2 12	2 01
	15	5 05	4 51	4 36	4 19	4 09	3 57	3 43	3 27	3 19	3 11	3 01	2 50	2 37
	16	5 58	5 43	5 27	5 10	4 59	4 47	4 33	4 16	4 08	3 59	3 49	3 38	3 25
	17	6 51	6 36	6 22	6 04	5 54	5 43	5 29	5 13	5 05	4 57	4 47	4 36	4 23
	18	7 44	7 31	7 18	7 02	6 53	6 43	6 31	6 17	6 10	6 02	5 54	5 44	5 33
	19	8 37	8 26	8 15	8 03	7 55	7 47	7 37	7 25	7 20	7 14	7 07	6 59	6 50
	20	9 29	9 21	9 13	9 04	8 59	8 53	8 45	8 37	8 33	8 29	8 24	8 18	8 12
	21	10 20	10 16	10 11	10 06	10 03	9 59	9 55	9 50	9 48	9 46	9 43	9 40	9 37
	22	11 11	11 10	11 09	11 08	11 07	11 07	11 06	11 05	11 05	11 04	11 04	11 03	11 02
	23	12 02	12 05	12 08	12 11	12 13	12 15	12 17	12 20	12 22	12 23	12 25	12 27	12 29
	24	12 54	13 00	13 07	13 14	13 19	13 23	13 29	13 36	13 39	13 43	13 47	13 51	13 56
	25	13 48	13 57	14 07	14 18	14 25	14 32	14 41	14 52	14 56	15 02	15 08	15 15	15 22
	26	14 44	14 55	15 08	15 22	15 31	15 41	15 52	16 06	16 12	16 19	16 27	16 36	16 47
	27	15 40	15 54	16 09	16 25	16 35	16 47	17 00	17 16	17 24	17 32	17 41	17 52	18 05
	28	16 38	16 52	17 08	17 26	17 36	17 48	18 02	18 20	18 28	18 37	18 47	18 59	19 12
	29	17 35	17 49	18 05	18 22	18 33	18 45	18 58	19 15	19 23	19 32	19 42	19 53	20 07
July	1	18 30	18 43	18 58	19 14	19 23	19 34	19 47	20 02	20 09	20 17	20 26	20 36	20 48
	2	19 23	19 34	19 46	20 00	20 08	20 17	20 28	20 41	20 47	20 54	21 01	21 09	21 18

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat. Date		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
May	17	h m 17 08	h m 17 20	h m 17 31	h m 17 45	h m 17 53	h m 18 02	h m 18 13	h m 18 26	h m 18 32	h m 18 38	h m 18 46	h m 18 54	h m 19 04
	18	17 56	18 09	18 23	18 39	18 48	18 58	19 11	19 26	19 33	19 41	19 50	20 00	20 11
	19	18 46	19 00	19 15	19 32	19 42	19 54	20 07	20 24	20 32	20 41	20 50	21 01	21 14
	20	19 37	19 51	20 07	20 25	20 35	20 47	21 01	21 18	21 26	21 34	21 44	21 56	22 09
	21	20 29	20 43	20 58	21 15	21 25	21 36	21 50	22 06	22 13	22 22	22 31	22 42	22 55
	22	21 21	21 34	21 47	22 03	22 12	22 22	22 34	22 48	22 55	23 02	23 11	23 20	23 31
	23	22 13	22 24	22 35	22 48	22 55	23 04	23 14	23 25	23 31	23 37	23 43	23 51	23 59
	24	23 04	23 12	23 21	23 31	23 36	23 42	23 49	23 58	0 02	0 06	0 11	0 17	0 23
	25	23 56	0 01	0 06	0 12	0 15	0 19	0 23	0 28	0 30	0 33	0 36	0 39	0 43
	26	.. ..	0 01	0 06	0 12	0 15	0 19	0 23	0 28	0 30	0 33	0 36	0 39	0 43
	27	0 47	0 48	0 50	0 52	0 52	0 54	0 55	0 56	0 57	0 58	0 59	0 59	1 01
	28	1 39	1 37	1 34	1 32	1 30	1 29	1 27	1 25	1 24	1 23	1 21	1 20	1 18
	29	2 32	2 26	2 20	2 14	2 10	2 05	2 00	1 54	1 52	1 49	1 45	1 41	1 37
	30	3 27	3 18	3 09	2 58	2 52	2 45	2 37	2 27	2 23	2 18	2 12	2 06	1 59
	31	4 24	4 12	4 00	3 46	3 38	3 28	3 18	3 05	2 58	2 52	2 44	2 36	2 27
June	1	5 22	5 09	4 54	4 38	4 28	4 17	4 04	3 49	3 41	3 33	3 24	3 14	3 02
	2	6 21	6 07	5 51	5 33	5 23	5 11	4 57	4 40	4 32	4 23	4 13	4 01	3 48
	3	7 19	7 05	6 49	6 31	6 21	6 09	5 55	5 38	5 30	5 21	5 11	4 59	4 46
	4	8 15	8 01	7 47	7 31	7 21	7 10	6 57	6 42	6 34	6 26	6 17	6 06	5 54
	5	9 07	8 56	8 44	8 30	8 21	8 12	8 01	7 48	7 41	7 34	7 27	7 18	7 08
	6	9 57	9 48	9 38	9 27	9 20	9 13	9 04	8 54	8 49	8 44	8 38	8 31	8 24
	7	10 43	10 37	10 30	10 22	10 18	10 13	10 07	9 59	9 56	9 52	9 48	9 44	9 39
	8	11 27	11 24	11 20	11 16	11 13	11 11	11 07	11 04	11 02	11 00	10 57	10 55	10 52
	9	12 10	12 10	12 09	12 08	12 08	12 08	12 07	12 06	12 06	12 06	12 05	12 05	12 04
	10	12 52	12 55	12 57	13 00	13 02	13 04	13 06	13 08	13 10	13 11	13 12	13 14	13 16
	11	13 35	13 40	13 46	13 52	13 56	14 00	14 05	14 10	14 13	14 16	14 19	14 23	14 27
	12	14 18	14 26	14 34	14 44	14 50	14 56	15 03	15 12	15 16	15 21	15 26	15 31	15 38
	13	15 03	15 13	15 24	15 37	15 44	15 53	16 02	16 14	16 20	16 26	16 32	16 40	16 49
	14	15 50	16 02	16 15	16 31	16 39	16 49	17 01	17 15	17 22	17 29	17 38	17 47	17 58
	15	16 39	16 53	17 08	17 25	17 34	17 46	17 59	18 15	18 22	18 31	18 40	18 51	19 04
	16	17 30	17 45	18 00	18 18	18 28	18 40	18 54	19 11	19 19	19 28	19 38	19 49	20 03
	17	18 23	18 37	18 53	19 10	19 20	19 32	19 46	20 02	20 10	20 19	20 29	20 40	20 53
	18	19 16	19 29	19 44	20 00	20 09	20 20	20 33	20 48	20 55	21 03	21 12	21 22	21 33
	19	20 09	20 21	20 33	20 47	20 55	21 04	21 15	21 27	21 33	21 40	21 47	21 55	22 05
	20	21 02	21 11	21 20	21 31	21 37	21 44	21 52	22 02	22 07	22 11	22 17	22 23	22 30
	21	21 53	21 59	22 06	22 13	22 17	22 22	22 27	22 33	22 36	22 39	22 43	22 47	22 51
	22	22 44	22 47	22 50	22 53	22 55	22 57	22 59	23 02	23 03	23 04	23 06	23 08	23 10
	23	23 35	23 34	23 34	23 33	23 32	23 31	23 30	23 30	23 29	23 29	23 28	23 27	23 27
	24	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	23 58	23 56	23 54	23 51	23 48	23 45
	25	0 27	0 23	0 18	0 13	0 10	0 07	0 03	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
	26	1 20	1 12	1 04	0 55	0 50	0 44	0 37	0 28	0 25	0 20	0 16	0 11	0 05
	27	2 14	2 04	1 53	1 40	1 33	1 24	1 14	1 03	0 57	0 51	0 45	0 37	0 29
	28	3 10	2 58	2 44	2 28	2 19	2 09	1 57	1 42	1 36	1 28	1 20	1 10	0 59
	29	4 08	3 54	3 38	3 21	3 11	2 59	2 46	2 29	2 21	2 13	2 03	1 52	1 39
	30	5 05	4 51	4 35	4 17	4 07	3 55	3 40	3 23	3 15	3 06	2 56	2 44	2 30
July	1	6 02	5 48	5 33	5 15	5 05	4 54	4 40	4 24	4 16	4 07	3 57	3 46	3 33
	2	6 56	6 43	6 30	6 14	6 05	5 55	5 43	5 29	5 22	5 14	5 05	4 56	4 45

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date														
July	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	18 30	18 43	18 58	19 14	19 23	19 34	19 47	20 02	20 09	20 17	20 26	20 36	20 48
	3	19 23	19 34	19 46	20 00	20 08	20 17	20 28	20 41	20 47	20 54	21 01	21 09	21 18
	4	20 12	20 21	20 31	20 42	20 48	20 55	21 04	21 14	21 18	21 23	21 29	21 35	21 42
	5	20 59	21 06	21 12	21 20	21 24	21 29	21 35	21 42	21 45	21 48	21 52	21 56	22 01
	6	21 44	21 48	21 51	21 55	21 58	22 00	22 03	22 07	22 09	22 10	22 12	22 15	22 17
	7	22 27	22 28	22 28	22 29	22 29	22 29	22 30	22 30	22 30	22 31	22 31	22 31	22 32
	8	23 10	23 07	23 05	23 02	23 00	22 58	22 56	22 53	22 52	22 51	22 49	22 48	22 46
	9	23 52	23 47	23 41	23 35	23 31	23 27	23 23	23 17	23 14	23 12	23 09	23 05	23 01
	10	0 36	0 28	0 19	0 10	0 04	...	...	...	...	23 59	23 53	23 46	23 38
	11	1 20	1 10	0 59	0 47	0 40	0 31	0 22	0 10	0 05	...	...	...	...
	12	2 07	1 55	1 42	1 27	1 18	1 09	0 57	0 43	0 37	0 30	0 22	0 13	0 03
	13	2 56	2 43	2 28	2 11	2 01	1 50	1 37	1 22	1 14	1 06	0 57	0 46	0 34
	14	3 48	3 33	3 18	3 00	2 50	2 38	2 24	2 07	1 59	1 51	1 41	1 29	1 16
	15	4 41	4 26	4 11	3 53	3 43	3 32	3 18	3 01	2 53	2 44	2 34	2 23	2 10
	16	5 35	5 21	5 07	4 51	4 41	4 31	4 18	4 03	3 55	3 47	3 38	3 28	3 16
	17	6 29	6 18	6 05	5 52	5 43	5 34	5 24	5 10	5 04	4 58	4 50	4 41	4 32
	18	7 23	7 14	7 05	6 54	6 48	6 41	6 32	6 23	6 18	6 13	6 07	6 01	5 54
	19	8 16	8 10	8 04	7 57	7 53	7 49	7 44	7 37	7 34	7 31	7 28	7 24	7 19
	20	9 08	9 06	9 03	9 01	8 59	8 57	8 56	8 53	8 52	8 51	8 50	8 48	8 47
	21	10 00	10 01	10 03	10 04	10 05	10 06	10 08	10 09	10 10	10 11	10 12	10 13	10 14
	22	10 52	10 57	11 02	11 08	11 11	11 15	11 20	11 25	11 28	11 31	11 34	11 37	11 41
	23	11 45	11 53	12 02	12 11	12 17	12 24	12 31	12 41	12 45	12 50	12 55	13 01	13 07
	24	12 39	12 50	13 01	13 15	13 22	13 31	13 42	13 54	14 00	14 07	14 14	14 22	14 32
	25	13 34	13 47	14 01	14 17	14 26	14 37	14 49	15 05	15 12	15 20	15 29	15 39	15 51
	26	14 30	14 44	15 00	15 17	15 27	15 39	15 53	16 10	16 18	16 26	16 36	16 48	17 01
	27	15 26	15 40	15 56	16 14	16 24	16 36	16 50	17 07	17 15	17 24	17 34	17 46	17 59
	28	16 21	16 35	16 49	17 06	17 16	17 27	17 41	17 57	18 04	18 12	18 22	18 32	18 45
	29	17 14	17 26	17 39	17 54	18 03	18 13	18 24	18 38	18 45	18 52	19 00	19 09	19 19
	30	18 04	18 14	18 25	18 37	18 45	18 53	19 02	19 13	19 18	19 24	19 31	19 38	19 46
Aug.	31	18 52	19 00	19 08	19 17	19 22	19 28	19 35	19 43	19 47	19 51	19 56	20 01	20 07
	1	19 38	19 43	19 48	19 54	19 57	20 00	20 05	20 10	20 12	20 15	20 18	20 21	20 24
	2	20 22	20 24	20 26	20 28	20 29	20 31	20 32	20 34	20 35	20 36	20 37	20 38	20 39
	3	21 05	21 04	21 03	21 01	21 01	21 00	20 59	20 58	20 57	20 56	20 56	20 55	20 54
	4	21 48	21 44	21 40	21 35	21 32	21 29	21 25	21 21	21 19	21 17	21 15	21 12	21 09
	5	22 31	22 24	22 17	22 09	22 04	21 59	21 53	21 46	21 42	21 39	21 35	21 30	21 25
	6	23 15	23 05	22 56	22 45	22 38	22 31	22 23	22 12	22 08	22 03	21 57	21 51	21 44
	7	...	23 49	23 37	23 23	23 15	23 06	22 55	22 43	22 37	22 30	22 23	22 15	22 06
	8	0 00	...	...	...	23 55	23 45	23 33	23 18	23 11	23 03	22 55	22 45	22 34
	9	0 47	0 34	0 21	0 05	...	...	...	...	23 52	23 43	23 34	23 23	23 11
	10	1 37	1 23	1 08	0 51	0 41	0 29	0 16	0 00	...	...	...	...	23 58
	11	2 29	2 14	1 59	1 41	1 31	1 19	1 06	0 49	0 41	0 32	0 22	0 11	...
	12	3 22	3 08	2 53	2 36	2 26	2 15	2 02	1 46	1 38	1 30	1 21	1 10	0 57
	13	4 16	4 04	3 51	3 35	3 27	3 17	3 05	2 51	2 44	2 37	2 28	2 19	2 08
	14	5 10	5 00	4 50	4 38	4 30	4 22	4 13	4 01	3 56	3 50	3 44	3 36	3 28
	15	6 05	5 58	5 50	5 42	5 37	5 31	5 24	5 16	5 13	5 09	5 04	4 59	4 54
	16	6 59	6 55	6 51	6 47	6 44	6 41	6 38	6 34	6 32	6 30	6 28	6 25	6 22
	17	7 53	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July	1	6 02	5 48	5 33	5 15	5 05	4 54	4 40	4 24	4 16	4 07	3 57	3 46	3 33
	2	6 56	6 43	6 30	6 14	6 05	5 55	5 43	5 29	5 22	5 14	5 05	4 56	4 45
	3	7 47	7 37	7 26	7 13	7 06	6 57	6 47	6 35	6 30	6 24	6 17	6 09	6 00
	4	8 35	8 28	8 19	8 10	8 05	7 58	7 51	7 42	7 38	7 34	7 29	7 23	7 17
	5	9 21	9 16	9 11	9 05	9 02	8 58	8 53	8 48	8 45	8 42	8 39	8 36	8 32
	6	10 05	10 03	10 01	9 59	9 57	9 56	9 54	9 52	9 51	9 50	9 49	9 47	9 46
	7	10 48	10 49	10 50	10 51	10 52	10 53	10 54	10 55	10 55	10 56	10 56	10 57	10 58
	8	11 30	11 34	11 38	11 43	11 46	11 49	11 53	11 57	11 59	12 01	12 03	12 06	12 09
	9	12 13	12 20	12 27	12 35	12 40	12 45	12 51	12 59	13 02	13 06	13 10	13 15	13 20
	10	12 57	13 06	13 16	13 27	13 34	13 41	13 50	14 00	14 05	14 10	14 16	14 23	14 31
	11	13 43	13 54	14 06	14 20	14 28	14 38	14 48	15 02	15 08	15 14	15 22	15 31	15 41
	12	14 31	14 44	14 58	15 14	15 23	15 34	15 47	16 02	16 09	16 17	16 26	16 36	16 48
	13	15 21	15 35	15 50	16 08	16 18	16 29	16 43	17 00	17 07	17 16	17 26	17 37	17 50
	14	16 13	16 27	16 43	17 01	17 11	17 23	17 37	17 54	18 02	18 10	18 20	18 32	18 45
	15	17 06	17 20	17 35	17 52	18 02	18 13	18 26	18 42	18 50	18 58	19 07	19 18	19 30
	16	18 01	18 13	18 26	18 41	18 50	19 00	19 11	19 25	19 32	19 39	19 47	19 56	20 06
	17	18 55	19 05	19 15	19 28	19 35	19 43	19 52	20 03	20 08	20 14	20 20	20 27	20 35
	18	19 48	19 55	20 03	20 11	20 16	20 22	20 28	20 36	20 40	20 43	20 48	20 52	20 58
	19	20 40	20 44	20 49	20 53	20 56	20 59	21 02	21 06	21 08	21 10	21 12	21 15	21 18
	20	21 32	21 33	21 33	21 34	21 34	21 34	21 35	21 35	21 35	21 35	21 35	21 36	21 36
	21	22 24	22 21	22 18	22 14	22 12	22 10	22 07	22 03	22 02	22 00	21 58	21 56	21 54
	22	23 17	23 10	23 04	22 56	22 51	22 46	22 40	22 33	22 30	22 27	22 23	22 18	22 14
	23	...	...	23 51	23 39	23 33	23 25	23 16	23 06	23 01	22 56	22 50	22 43	22 36
	24	0 10	0 01	...	...	...	...	23 57	23 43	23 37	23 30	23 22	23 13	23 03
	25	1 05	0 53	0 40	0 26	0 17	0 08	...	...	...	...	...	23 51	23 39
	26	2 01	1 47	1 33	1 16	1 06	0 55	0 42	0 26	0 19	0 10	0 01	...	...
	27	2 57	2 42	2 27	2 09	1 59	1 47	1 33	1 16	1 08	0 59	0 49	0 37	0 24
	28	3 52	3 38	3 23	3 05	2 55	2 43	2 29	2 13	2 05	1 56	1 46	1 34	1 21
	29	4 46	4 33	4 19	4 03	3 54	3 43	3 30	3 14	3 07	2 59	2 50	2 40	2 28
	30	5 38	5 27	5 15	5 01	4 53	4 44	4 33	4 20	4 14	4 07	3 59	3 51	3 41
Aug.	31	6 28	6 19	6 09	5 58	5 52	5 45	5 36	5 26	5 21	5 16	5 10	5 04	4 56
	1	7 15	7 08	7 02	6 54	6 50	6 45	6 39	6 32	6 29	6 25	6 21	6 17	6 12
	2	7 59	7 56	7 53	7 49	7 46	7 44	7 41	7 37	7 35	7 33	7 31	7 29	7 27
	3	8 43	8 43	8 42	8 42	8 42	8 42	8 41	8 41	8 41	8 40	8 40	8 40	8 40
	4	9 26	9 28	9 31	9 34	9 36	9 38	9 41	9 43	9 45	9 46	9 48	9 50	9 52
	5	10 08	10 14	10 20	10 26	10 30	10 34	10 39	10 45	10 48	10 51	10 55	10 58	11 03
	6	10 52	11 00	11 08	11 18	11 24	11 30	11 38	11 47	11 51	11 56	12 01	12 06	12 13
	7	11 36	11 47	11 58	12 10	12 18	12 26	12 36	12 48	12 53	12 59	13 06	13 14	13 22
	8	12 23	12 35	12 48	13 03	13 12	13 22	13 33	13 48	13 54	14 02	14 10	14 19	14 30
	9	13 11	13 25	13 39	13 56	14 06	14 17	14 30	14 46	14 53	15 02	15 11	15 22	15 34
	10	14 01	14 16	14 31	14 49	14 59	15 10	15 24	15 41	15 49	15 58	16 07	16 19	16 32
	11	14 54	15 08	15 23	15 40	15 51	16 02	16 15	16 32	16 40	16 48	16 58	17 09	17 21
	12	15 48	16 01	16 15	16 31	16 40	16 50	17 03	17 18	17 24	17 32	17 41	17 50	18 02
	13	16 42	16 53	17 05	17 19	17 26	17 35	17 46	17 58	18 04	18 10	18 17	18 25	18 34
	14	17 36	17 45	17 54	18 04	18 10	18 17	18 25	18 34	18 38	18 43	18 48	18 54	19 00
	15	18 31	18 36	18 42	18 48	18 52	18 56	19 01	19 06	19 09	19 12	19 15	19 18	19 22
	16	19 24	19 26	19 28	19 30	19 32	19 33	19 35	19 37	19 38	19 39	19 40	19 41	19 42
	17	20 18	20 16	20 14	20 12	20 11	20 10	20 08	20 06	20 05	20 05	20 03	20 02	20 01

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date \ Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Aug.	16	h m 6 59	h m 6 55	h m 6 51	h m 6 47	h m 6 44	h m 6 41	h m 6 38	h m 6 34	h m 6 32	h m 6 30	h m 6 28	h m 6 25	h m 6 22
	17	7 53	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52	7 52
	18	8 46	8 50	8 54	8 58	9 00	9 03	9 07	9 11	9 12	9 14	9 17	9 19	9 22
	19	9 40	9 47	9 55	10 03	10 08	10 13	10 20	10 28	10 32	10 36	10 40	10 45	10 51
	20	10 35	10 45	10 55	11 08	11 15	11 23	11 32	11 44	11 49	11 55	12 01	12 09	12 17
	21	11 30	11 43	11 56	12 11	12 19	12 30	12 41	12 56	13 03	13 10	13 18	13 28	13 38
	22	12 26	12 40	12 55	13 12	13 21	13 33	13 46	14 02	14 10	14 19	14 28	14 39	14 52
	23	13 22	13 36	13 51	14 09	14 19	14 31	14 45	15 02	15 10	15 19	15 29	15 40	15 53
	24	14 16	14 30	14 45	15 02	15 12	15 23	15 37	15 53	16 01	16 09	16 19	16 30	16 42
	25	15 09	15 21	15 35	15 51	16 00	16 10	16 22	16 37	16 44	16 51	17 00	17 09	17 20
	26	15 59	16 10	16 22	16 35	16 42	16 51	17 01	17 13	17 19	17 25	17 32	17 40	17 49
	27	16 47	16 56	17 05	17 15	17 21	17 28	17 36	17 45	17 49	17 54	17 59	18 05	18 12
	28	17 34	17 39	17 45	17 53	17 57	18 01	18 06	18 13	18 16	18 19	18 22	18 26	18 30
	29	18 18	18 21	18 24	18 28	18 30	18 32	18 35	18 38	18 39	18 41	18 43	18 45	18 47
	30	19 01	19 01	19 02	19 02	19 02	19 02	19 02	19 02	19 02	19 02	19 02	19 02	19 02
Sept.	31	19 44	19 41	19 38	19 35	19 33	19 31	19 28	19 25	19 24	19 22	19 21	19 19	19 17
	1	20 27	20 21	20 15	20 09	20 05	20 01	19 56	19 50	19 47	19 44	19 41	19 37	19 33
	2	21 10	21 02	20 54	20 44	20 38	20 32	20 24	20 15	20 11	20 07	20 02	19 56	19 50
	3	21 55	21 44	21 33	21 21	21 14	21 05	20 56	20 44	20 39	20 33	20 27	20 19	20 11
	4	22 41	22 29	22 16	22 01	21 52	21 42	21 31	21 17	21 11	21 04	20 56	20 47	20 37
	5	23 29	23 15	23 01	22 44	22 34	22 24	22 11	21 55	21 48	21 40	21 31	21 21	21 09
	6	...	...	23 49	23 32	23 21	23 10	22 56	22 40	22 32	22 24	22 14	22 03	21 50
	7	0 18	0 04	...	...	...	...	23 48	23 32	23 25	23 16	23 06	22 55	22 43
	8	1 09	0 55	0 40	0 23	0 13	0 02	...	...	...	...	...	23 58	23 47
	9	2 02	1 49	1 35	1 19	1 10	0 59	0 47	0 32	0 25	0 17	0 08	...	...
	10	2 55	2 44	2 32	2 19	2 11	2 02	1 51	1 39	1 33	1 26	1 19	1 10	1 01
	11	3 49	3 41	3 32	3 21	3 15	3 08	3 00	2 51	2 46	2 41	2 36	2 30	2 23
	12	4 44	4 38	4 33	4 26	4 22	4 18	4 13	4 07	4 04	4 01	3 58	3 54	3 50
	13	5 38	5 36	5 34	5 32	5 31	5 29	5 28	5 26	5 25	5 24	5 23	5 21	5 20
	14	6 33	6 35	6 37	6 39	6 40	6 42	6 44	6 46	6 47	6 48	6 49	6 50	6 52
	15	7 29	7 34	7 40	7 47	7 51	7 55	8 00	8 06	8 09	8 12	8 16	8 20	8 24
	16	8 25	8 34	8 43	8 54	9 00	9 07	9 15	9 25	9 30	9 35	9 41	9 47	9 55
	17	9 23	9 34	9 46	10 00	10 08	10 18	10 28	10 42	10 48	10 55	11 02	11 11	11 21
	18	10 20	10 33	10 47	11 04	11 13	11 24	11 37	11 52	12 00	12 08	12 17	12 27	12 39
	19	11 17	11 31	11 46	12 03	12 13	12 25	12 39	12 55	13 03	13 12	13 22	13 33	13 46
Oct.	20	12 12	12 26	12 41	12 59	13 09	13 20	13 34	13 50	13 58	14 06	14 16	14 27	14 40
	21	13 06	13 19	13 33	13 49	13 58	14 08	14 21	14 36	14 43	14 51	15 00	15 10	15 21
	22	13 56	14 08	14 20	14 34	14 42	14 51	15 02	15 15	15 21	15 27	15 35	15 43	15 52
	23	14 45	14 54	15 04	15 15	15 21	15 29	15 37	15 47	15 52	15 57	16 03	16 09	16 17
	24	15 31	15 38	15 45	15 53	15 58	16 03	16 09	16 16	16 19	16 23	16 27	16 32	16 37
	25	16 16	16 20	16 24	16 28	16 31	16 34	16 38	16 42	16 44	16 46	16 48	16 51	16 54
	26	16 59	17 00	17 01	17 02	17 03	17 04	17 05	17 06	17 07	17 07	17 08	17 08	17 09
	27	17 42	17 40	17 38	17 36	17 35	17 33	17 32	17 30	17 29	17 28	17 27	17 26	17 24
	28	18 25	18 20	18 15	18 09	18 06	18 03	17 59	17 54	17 51	17 49	17 46	17 43	17 40
	29	19 08	19 00	18 53	18 44	18 39	18 33	18 27	18 19	18 15	18 12	18 07	18 02	17 57
	30	19 52	19 42	19 32	19 20	19 14	19 06	18 57	18 47	18 42	18 37	18 31	18 24	18 17
	1	20 37	20 25	20 13	19 59	19 51	19 42	19 31	19 18	19 12	19 06	18 58	18 50	18 40
	2	21 24	21 11	20 57	20 41	20 32	20 21	20 09	19 54	19 47	19 39	19 31	19 21	19 10

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date \ Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Aug.	16	19 24	19 26	19 28	19 30	19 32	19 33	19 35	19 37	19 38	19 39	19 40	19 41	19 42
	17	20 18	20 16	20 14	20 12	20 11	20 10	20 08	20 06	20 05	20 05	20 03	20 02	20 01
	18	21 12	21 07	21 01	20 55	20 51	20 47	20 42	20 37	20 34	20 31	20 28	20 25	20 21
	19	22 06	21 58	21 49	21 39	21 33	21 26	21 18	21 09	21 05	21 00	20 55	20 49	20 43
	20	23 01	22 50	22 38	22 25	22 17	22 08	21 58	21 45	21 40	21 33	21 26	21 18	21 09
	21	23 57	23 44	23 30	23 14	23 05	22 54	22 42	22 27	22 20	22 12	22 03	21 53	21 42
	22	...	...	...	...	23 56	23 44	23 31	23 14	23 06	22 58	22 48	22 37	22 24
	23	0 53	0 38	0 23	0 06	...	...	...	...	...	23 51	23 41	23 30	23 17
	24	1 48	1 33	1 18	1 01	0 50	0 39	0 25	0 08	0 00	...	...	...	...
	25	2 41	2 28	2 14	1 57	1 47	1 36	1 23	1 07	1 00	0 51	0 42	0 31	0 19
	26	3 33	3 21	3 08	2 54	2 45	2 35	2 24	2 10	2 03	1 56	1 48	1 39	1 29
	27	4 23	4 13	4 02	3 50	3 43	3 35	3 26	3 15	3 10	3 04	2 57	2 50	2 42
	28	5 10	5 03	4 55	4 46	4 41	4 35	4 28	4 20	4 16	4 12	4 07	4 02	3 56
	29	5 55	5 51	5 46	5 41	5 38	5 34	5 30	5 25	5 23	5 20	5 17	5 14	5 11
	30	6 39	6 38	6 36	6 34	6 33	6 32	6 30	6 29	6 28	6 27	6 26	6 25	6 24
Sept.	31	7 22	7 23	7 25	7 27	7 28	7 29	7 30	7 32	7 32	7 33	7 34	7 35	7 36
	1	8 05	8 09	8 14	8 19	8 22	8 25	8 29	8 34	8 36	8 38	8 41	8 44	8 47
	2	8 48	8 55	9 02	9 11	9 15	9 21	9 27	9 35	9 39	9 43	9 47	9 52	9 58
	3	9 32	9 41	9 51	10 02	10 09	10 17	10 25	10 36	10 41	10 46	10 53	10 59	11 07
	4	10 17	10 28	10 40	10 54	11 03	11 12	11 23	11 36	11 42	11 49	11 56	12 05	12 15
	5	11 04	11 17	11 31	11 46	11 56	12 06	12 19	12 34	12 41	12 49	12 58	13 08	13 19
	6	11 52	12 06	12 21	12 38	12 48	13 00	13 13	13 29	13 37	13 45	13 55	14 06	14 18
	7	12 43	12 57	13 12	13 29	13 39	13 51	14 04	14 21	14 29	14 37	14 47	14 58	15 11
	8	13 34	13 48	14 03	14 19	14 29	14 40	14 52	15 08	15 15	15 23	15 32	15 42	15 54
	9	14 27	14 40	14 52	15 07	15 16	15 25	15 36	15 50	15 56	16 03	16 11	16 20	16 30
	10	15 21	15 31	15 42	15 53	16 00	16 08	16 17	16 28	16 33	16 38	16 44	16 51	16 59
	11	16 15	16 22	16 30	16 38	16 43	16 48	16 54	17 02	17 05	17 09	17 13	17 18	17 23
	12	17 10	17 13	17 17	17 21	17 24	17 27	17 30	17 34	17 35	17 37	17 39	17 42	17 44
	13	18 04	18 04	18 04	18 04	18 05	18 05	18 04	18 04	18 04	18 04	18 04	18 04	18 04
	14	19 00	18 56	18 52	18 48	18 45	18 43	18 39	18 35	18 34	18 31	18 29	18 27	18 24
	15	19 56	19 49	19 41	19 33	19 28	19 22	19 16	19 08	19 05	19 01	18 56	18 52	18 46
	16	20 53	20 43	20 32	20 20	20 13	20 05	19 55	19 44	19 39	19 33	19 27	19 20	19 12
	17	21 50	21 38	21 24	21 09	21 01	20 51	20 39	20 25	20 18	20 11	20 03	19 54	19 44
	18	22 47	22 33	22 19	22 02	21 52	21 41	21 28	21 12	21 04	20 56	20 46	20 36	20 23
	19	23 43	23 29	23 14	22 56	22 46	22 35	22 21	22 04	21 56	21 48	21 38	21 26	21 14
	20	...	...	...	23 53	23 43	23 32	23 18	23 02	22 55	22 46	22 37	22 26	22 13
	21	0 38	0 24	0 10	...	...	...	...	...	23 57	23 50	23 41	23 32	23 21
	22	1 30	1 18	1 05	0 49	0 41	0 30	0 18	0 04	...	...	...	...	...
	23	2 20	2 10	1 58	1 46	1 38	1 30	1 20	1 08	1 02	0 56	0 49	0 41	0 32
	24	3 07	2 59	2 51	2 41	2 35	2 29	2 21	2 12	2 08	2 03	1 58	1 52	1 46
	25	3 53	3 47	3 42	3 35	3 32	3 27	3 22	3 16	3 14	3 10	3 07	3 03	2 59
	26	4 37	4 34	4 32	4 29	4 27	4 25	4 23	4 20	4 18	4 17	4 15	4 14	4 12
	27	5 20	5 20	5 21	5 21	5 21	5 22	5 22	5 22	5 23	5 23	5 23	5 23	5 24
	28	6 02	6 06	6 09	6 13	6 15	6 18	6 21	6 25	6 26	6 28	6 30	6 32	6 35
	29	6 45	6 51	6 58	7 05	7 09	7 14	7 20	7 26	7 29	7 33	7 36	7 41	7 45
Oct.	30	7 29	7 37	7 46	7 57	8 03	8 10	8 18	8 27	8 32	8 37	8 42	8 48	8 55
	1	8 13	8 24	8 36	8 49	8 56	9 05	9 15	9 27	9 33	9 39	9 46	9 54	10 03
	2	8 59	9 12	9 25	9 40	9 49	9 59	10 11	10 26	10 32	10 40	10 48	10 58	11 08

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

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Date	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct.	1	20 37	20 25	20 13	19 59	19 51	19 42	19 31	19 18	19 12	19 06	18 58	18 50	18 40
	2	21 24	21 11	20 57	20 41	20 32	20 21	20 09	19 54	19 47	19 39	19 31	19 21	19 10
	3	22 12	21 58	21 43	21 26	21 16	21 05	20 52	20 36	20 28	20 20	20 10	20 00	19 47
	4	23 02	22 47	22 32	22 15	22 05	21 54	21 40	21 24	21 16	21 08	20 58	20 47	20 34
	5	23 52	23 39	23 24	23 08	22 58	22 48	22 35	22 19	22 12	22 04	21 55	21 44	21 32
	6	...	...	...	...	23 56	23 46	23 35	23 21	23 14	23 07	22 59	22 50	22 40
	7	0 44	0 32	0 19	0 04	...	...	...	...	...	...	...	...	23 56
	8	1 36	1 26	1 15	1 03	0 56	0 49	0 39	0 28	0 23	0 17	0 11	0 04	...
	9	2 28	2 21	2 14	2 05	2 00	1 55	1 48	1 40	1 37	1 33	1 28	1 23	1 18
	10	3 21	3 18	3 14	3 09	3 07	3 04	3 00	2 56	2 54	2 52	2 50	2 47	2 44
	11	4 16	4 15	4 15	4 15	4 15	4 15	4 15	4 15	4 15	4 15	4 15	4 15	4 15
	12	5 11	5 15	5 18	5 23	5 25	5 28	5 31	5 35	5 37	5 39	5 42	5 44	5 47
	13	6 08	6 15	6 23	6 31	6 36	6 42	6 49	6 57	7 01	7 05	7 09	7 14	7 20
	14	7 07	7 17	7 28	7 40	7 47	7 56	8 05	8 17	8 23	8 29	8 35	8 43	8 51
	15	8 06	8 19	8 32	8 47	8 56	9 06	9 18	9 33	9 40	9 48	9 56	10 06	10 17
	16	9 05	9 19	9 34	9 51	10 01	10 13	10 26	10 42	10 50	10 58	11 08	11 19	11 32
	17	10 04	10 18	10 33	10 50	11 00	11 12	11 26	11 42	11 50	11 59	12 09	12 20	12 33
	18	10 59	11 13	11 27	11 44	11 53	12 04	12 17	12 33	12 40	12 48	12 57	13 08	13 20
	19	11 52	12 04	12 17	12 32	12 40	12 50	13 01	13 15	13 21	13 28	13 36	13 45	13 55
	20	12 42	12 52	13 03	13 15	13 22	13 30	13 39	13 50	13 55	14 01	14 07	14 14	14 22
	21	13 29	13 37	13 45	13 54	13 59	14 05	14 12	14 20	14 24	14 28	14 32	14 37	14 43
	22	14 14	14 19	14 24	14 30	14 33	14 37	14 41	14 46	14 49	14 51	14 54	14 57	15 01
	23	14 58	15 00	15 02	15 04	15 05	15 07	15 09	15 11	15 12	15 13	15 14	15 15	15 17
	24	15 41	15 40	15 39	15 37	15 37	15 36	15 35	15 34	15 34	15 34	15 33	15 32	15 32
	25	16 23	16 19	16 15	16 11	16 08	16 05	16 02	15 58	15 56	15 54	15 52	15 50	15 47
	26	17 06	16 59	16 53	16 45	16 40	16 36	16 30	16 23	16 20	16 16	16 12	16 08	16 03
	27	17 50	17 41	17 31	17 21	17 15	17 08	16 59	16 50	16 45	16 40	16 35	16 29	16 22
	28	18 35	18 24	18 12	17 59	17 51	17 42	17 32	17 20	17 14	17 08	17 01	16 53	16 45
	29	19 21	19 08	18 55	18 40	18 31	18 21	18 09	17 54	17 48	17 40	17 32	17 23	17 12
	30	20 09	19 55	19 40	19 24	19 14	19 03	18 50	18 34	18 27	18 18	18 09	17 59	17 47
Nov.	31	20 58	20 44	20 29	20 11	20 01	19 50	19 36	19 20	19 12	19 04	18 54	18 43	18 30
	1	21 47	21 34	21 19	21 02	20 52	20 41	20 28	20 12	20 05	19 56	19 47	19 36	19 24
	2	22 38	22 25	22 12	21 56	21 47	21 37	21 25	21 10	21 04	20 56	20 48	20 38	20 27
	3	23 28	23 17	23 06	22 53	22 45	22 36	22 26	22 14	22 08	22 02	21 55	21 47	21 38
	4	...	...	...	23 52	23 46	23 39	23 31	23 22	23 18	23 13	23 08	23 02	22 55
	5	0 18	0 10	0 02	...	...	...	...	...	...	...	...	...	...
	6	1 09	1 04	0 58	0 52	0 48	0 44	0 39	0 34	0 31	0 28	0 25	0 21	0 17
	7	2 01	1 59	1 57	1 55	1 54	1 52	1 50	1 48	1 47	1 46	1 45	1 44	1 42
	8	2 54	2 56	2 57	2 59	3 01	3 02	3 04	3 05	3 06	3 07	3 08	3 09	3 11
	9	3 49	3 54	4 00	4 06	4 10	4 14	4 19	4 25	4 27	4 30	4 34	4 37	4 42
	10	4 46	4 55	5 04	5 14	5 20	5 27	5 35	5 45	5 50	5 55	6 00	6 07	6 14
	11	5 45	5 57	6 09	6 23	6 31	6 40	6 51	7 04	7 11	7 18	7 25	7 34	7 44
	12	6 46	6 59	7 14	7 30	7 40	7 51	8 03	8 19	8 27	8 35	8 44	8 54	9 06
	13	7 47	8 01	8 16	8 34	8 44	8 56	9 09	9 26	9 34	9 43	9 53	10 04	10 17
	14	8 46	9 00	9 15	9 32	9 42	9 54	10 07	10 23	10 31	10 40	10 49	11 00	11 13
	15	9 42	9 55	10 09	10 25	10 34	10 44	10 56	11 11	11 18	11 25	11 34	11 43	11 54
	16	10 35	10 46	10 58	11 11	11 19	11 27	11 37	11 50	11 55	12 02	12 09	12 16	12 25
	17	11 25	11 33	11 42	11 53	11 58	12 05	12 13	12 22	12 27	12 31	12 37	12 42	12 49

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

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Date	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct.	1	8 13	8 24	8 36	8 49	8 56	9 05	9 15	9 27	9 33	9 39	9 46	9 54	10 03
	2	8 59	9 12	9 25	9 40	9 49	9 59	10 11	10 26	10 32	10 40	10 48	10 58	11 08
	3	9 47	10 01	10 15	10 32	10 41	10 52	11 05	11 21	11 29	11 37	11 46	11 57	12 09
	4	10 36	10 50	11 05	11 22	11 32	11 44	11 57	12 13	12 21	12 30	12 39	12 50	13 03
	5	11 26	11 40	11 54	12 11	12 21	12 32	12 45	13 01	13 09	13 17	13 26	13 37	13 49
	6	12 17	12 29	12 43	12 58	13 07	13 18	13 30	13 44	13 51	13 58	14 07	14 16	14 27
	7	13 08	13 19	13 31	13 44	13 52	14 00	14 10	14 22	14 28	14 34	14 41	14 49	14 57
	8	14 01	14 09	14 18	14 28	14 34	14 40	14 48	14 57	15 01	15 06	15 11	15 17	15 23
	9	14 53	14 59	15 04	15 11	15 15	15 19	15 23	15 29	15 32	15 35	15 38	15 41	15 45
	10	15 47	15 49	15 51	15 53	15 55	15 56	15 58	16 00	16 01	16 02	16 03	16 04	16 05
	11	16 42	16 40	16 38	16 36	16 35	16 34	16 32	16 30	16 30	16 29	16 27	16 26	16 25
	12	17 38	17 33	17 27	17 21	17 17	17 13	17 08	17 02	17 00	16 57	16 54	16 50	16 46
	13	18 36	18 27	18 18	18 08	18 02	17 55	17 47	17 37	17 33	17 28	17 23	17 17	17 11
	14	19 35	19 23	19 11	18 58	18 50	18 41	18 30	18 17	18 11	18 05	17 57	17 49	17 40
	15	20 34	20 21	20 07	19 51	19 41	19 31	19 18	19 03	18 56	18 48	18 39	18 29	18 17
	16	21 33	21 19	21 04	20 47	20 37	20 25	20 11	19 55	19 47	19 38	19 29	19 18	19 05
	17	22 31	22 17	22 02	21 44	21 34	21 23	21 09	20 53	20 45	20 37	20 27	20 16	20 03
	18	23 25	23 12	22 58	22 43	22 33	22 23	22 10	21 55	21 48	21 40	21 31	21 21	21 10
	19	...	...	22 54	23 40	23 32	23 23	23 13	23 00	22 54	22 47	22 40	22 31	22 22
	20	0 17	0 06	...	...	...	...	...	...	...	23 55	23 49	23 43	23 35
	21	1 05	0 56	0 47	0 36	0 30	0 23	0 15	0 05	0 00	...	...	...	...
	22	1 51	1 45	1 39	1 31	1 27	1 22	1 16	1 09	1 06	1 02	0 58	0 54	0 49
	23	2 35	2 32	2 29	2 24	2 22	2 19	2 16	2 12	2 11	2 09	2 06	2 04	2 02
	24	3 18	3 18	3 17	3 17	3 16	3 16	3 15	3 15	3 15	3 14	3 14	3 13	3 13
	25	4 01	4 03	4 06	4 09	4 10	4 12	4 14	4 17	4 18	4 19	4 21	4 22	4 24
	26	4 44	4 49	4 54	5 00	5 04	5 08	5 13	5 18	5 21	5 24	5 27	5 31	5 35
	27	5 27	5 35	5 43	5 52	5 58	6 04	6 11	6 20	6 24	6 28	6 33	6 38	6 45
	28	6 11	6 21	6 32	6 44	6 51	6 59	7 09	7 20	7 25	7 31	7 38	7 45	7 54
	29	6 57	7 09	7 22	7 36	7 45	7 54	8 06	8 19	8 26	8 33	8 41	8 50	9 00
	30	7 44	7 57	8 11	8 28	8 37	8 48	9 01	9 16	9 24	9 32	9 41	9 51	10 03
Nov.	31	8 32	8 46	9 01	9 18	9 29	9 40	9 53	10 10	10 17	10 26	10 36	10 46	10 59
	1	9 22	9 36	9 50	10 08	10 18	10 29	10 42	10 59	11 06	11 15	11 24	11 35	11 47
	2	10 12	10 25	10 39	10 55	11 04	11 15	11 27	11 42	11 49	11 57	12 06	12 16	12 27
	3	11 02	11 13	11 26	11 40	11 48	11 58	12 08	12 21	12 27	12 34	12 42	12 50	13 00
	4	11 52	12 02	12 12	12 23	12 30	12 37	12 46	12 56	13 01	13 06	13 12	13 19	13 26
	5	12 43	12 49	12 57	13 05	13 09	13 15	13 21	13 28	13 31	13 35	13 39	13 43	13 48
	6	13 34	13 37	13 41	13 46	13 48	13 51	13 54	13 58	13 59	14 01	14 03	14 06	14 08
	7	14 26	14 26	14 26	14 27	14 27	14 27	14 27	14 27	14 27	14 27	14 27	14 27	14 27
	8	15 20	15 17	15 13	15 09	15 07	15 04	15 01	14 57	14 56	14 54	14 52	14 49	14 47
	9	16 16	16 09	16 02	15 54	15 49	15 43	15 37	15 30	15 26	15 23	15 18	15 14	15 09
	10	17 14	17 04	16 54	16 42	16 35	16 27	16 17	16 07	16 01	15 56	15 50	15 43	15 35
	11	18 14	18 02	17 49	17 34	17 25	17 15	17 03	16 49	16 42	16 35	16 27	16 18	16 08
	12	19 15	19 01	18 46	18 30	18 20	18 08	17 55	17 39	17 31	17 23	17 13	17 03	16 50
	13	20 15	20 01	19 46	19 28	19 18	19 06	18 53	18 36	18 28	18 19	18 09	17 58	17 45
	14	21 13	21 00	20 45	20 29	20 19	20 08	19 55	19 39	19 31	19 23	19 13	19 03	18 50
	15	22 08	21 56	21 43	21 29	21 20	21 10	20 59	20 45	20 38	20 31	20 23	20 14	20 03
	16	22 59	22 50	22 39	22 27	22 20	22 12	22 03	21 52	21 46	21 41	21 34	21 27	21 19
	17	23 47	23 40	23 33	23 24	23 19	23 13	23 06	22 58	22 54	22 50	22 45	22 40	22 34

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat. Date		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov.	16	10 35	10 46	10 58	11 11	11 19	11 27	11 37	11 50	11 55	12 02	12 09	12 16	12 25
	17	11 25	11 33	11 42	11 53	11 58	12 05	12 13	12 22	12 27	12 31	12 37	12 42	12 49
	18	12 11	12 17	12 23	12 30	12 34	12 39	12 44	12 50	12 53	12 56	13 00	13 04	13 08
	19	12 56	12 59	13 02	13 05	13 07	13 10	13 12	13 16	13 17	13 19	13 20	13 22	13 24
	20	13 39	13 39	13 39	13 39	13 39	13 39	13 39	13 39	13 39	13 40	13 40	13 40	13 40
	21	14 21	14 18	14 16	14 12	14 10	14 08	14 06	14 03	14 02	14 00	13 59	13 57	13 55
	22	15 04	14 58	14 53	14 46	14 42	14 38	14 33	14 27	14 24	14 22	14 18	14 15	14 11
	23	15 47	15 39	15 31	15 21	15 15	15 09	15 02	14 53	14 49	14 45	14 40	14 34	14 28
	24	16 32	16 21	16 10	15 58	15 51	15 43	15 33	15 22	15 17	15 11	15 04	14 57	14 49
	25	17 18	17 06	16 53	16 38	16 29	16 20	16 08	15 55	15 48	15 41	15 33	15 25	15 14
	26	18 06	17 52	17 38	17 21	17 12	17 01	16 48	16 33	16 25	16 17	16 08	15 58	15 46
	27	18 55	18 40	18 25	18 08	17 58	17 47	17 33	17 17	17 09	17 00	16 51	16 40	16 27
	28	19 45	19 31	19 16	18 58	18 48	18 37	18 24	18 07	18 00	17 51	17 41	17 30	17 18
	29	20 35	20 22	20 08	19 52	19 42	19 32	19 19	19 04	18 57	18 49	18 40	18 30	18 18
	30	21 25	21 14	21 01	20 47	20 39	20 30	20 19	20 06	20 00	19 53	19 45	19 37	19 27
Dec.	1	22 15	22 06	21 56	21 45	21 38	21 31	21 22	21 12	21 07	21 02	20 56	20 49	20 41
	2	23 05	22 58	22 51	22 44	22 39	22 34	22 28	22 21	22 17	22 14	22 10	22 05	22 00
	3	23 54	23 51	23 48	23 44	23 41	23 39	23 36	23 32	23 30	23 29	23 27	23 24	23 22
	4	0 45	0 45	0 45	0 45	0 45	0 45	0 46	0 46	0 46	0 46	0 46	0 46	0 46
	5	1 37	1 40	1 44	1 48	1 51	1 54	1 57	2 01	2 03	2 05	2 07	2 10	2 12
	6	2 31	2 37	2 45	2 53	2 58	3 04	3 10	3 18	3 22	3 26	3 30	3 35	3 41
	7	3 27	3 37	3 47	4 00	4 07	4 15	4 24	4 36	4 41	4 47	4 54	5 01	5 09
	8	4 26	4 38	4 51	5 06	5 15	5 26	5 37	5 52	5 59	6 06	6 15	6 24	6 35
	9	5 26	5 40	5 55	6 12	6 22	6 33	6 47	7 03	7 11	7 20	7 29	7 40	7 53
	10	6 27	6 41	6 56	7 14	7 24	7 36	7 50	8 07	8 14	8 23	8 33	8 45	8 58
	11	7 26	7 39	7 54	8 11	8 20	8 31	8 44	9 00	9 08	9 16	9 25	9 36	9 48
	12	8 22	8 34	8 47	9 02	9 10	9 20	9 31	9 45	9 51	9 58	10 06	10 15	10 25
	13	9 15	9 24	9 35	9 47	9 54	10 01	10 10	10 21	10 26	10 32	10 38	10 45	10 52
	14	10 04	10 11	10 19	10 27	10 32	10 38	10 44	10 52	10 56	11 00	11 04	11 09	11 14
	15	10 51	10 55	10 59	11 04	11 07	11 11	11 15	11 19	11 21	11 24	11 26	11 29	11 32
	16	11 35	11 36	11 38	11 39	11 40	11 41	11 43	11 44	11 45	11 45	11 46	11 47	11 48
	17	12 18	12 16	12 15	12 13	12 12	12 11	12 09	12 08	12 07	12 06	12 05	12 04	12 03
	18	13 01	12 56	12 52	12 46	12 43	12 40	12 36	12 32	12 29	12 27	12 25	12 22	12 19
	19	13 44	13 37	13 29	13 21	13 16	13 19	13 04	12 57	12 53	12 49	12 45	12 40	12 35
	20	14 28	14 18	14 08	13 57	13 50	13 43	13 34	13 24	13 19	13 14	13 08	13 02	12 54
	21	15 13	15 01	14 49	14 35	14 27	14 18	14 08	13 55	13 49	13 42	13 35	13 27	13 18
	22	16 00	15 47	15 33	15 17	15 08	14 58	14 45	14 31	14 24	14 16	14 07	13 58	13 47
	23	16 49	16 35	16 20	16 03	15 53	15 42	15 28	15 12	15 05	14 56	14 47	14 36	14 24
	24	17 39	17 25	17 10	16 52	16 42	16 31	16 17	16 01	15 53	15 44	15 35	15 23	15 11
	25	18 30	18 17	18 02	17 46	17 36	17 25	17 12	16 56	16 48	16 40	16 31	16 20	16 08
	26	19 22	19 09	18 56	18 41	18 33	18 23	18 11	17 57	17 51	17 43	17 35	17 26	17 15
	27	20 12	20 02	19 52	19 39	19 32	19 24	19 14	19 03	18 57	18 51	18 45	18 37	18 29
	28	21 03	20 55	20 47	20 38	20 33	20 27	20 20	20 12	20 08	20 04	19 59	19 54	19 47
	29	21 53	21 48	21 43	21 38	21 35	21 31	21 27	21 22	21 20	21 18	21 15	21 12	21 08
	30	22 42	22 41	22 40	22 39	22 38	22 37	22 36	22 35	22 34	22 33	22 33	22 32	22 31
	31	23 33	23 35	23 37	23 40	23 42	23 43	23 45	23 48	23 49	23 50	23 52	23 53	23 55

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov.	16	22 59	22 50	22 39	22 27	22 20	22 12	22 03	21 52	21 46	21 41	21 34	21 27	21 19
	17	23 47	23 40	23 33	23 24	23 19	23 13	23 06	22 58	22 54	22 50	22 45	22 40	22 34
	18	...	...	...	...	...	...	...	...	...	23 58	23 55	23 52	23 49
	19	0 33	0 28	0 24	0 18	0 15	0 12	0 08	0 03	0 00	...	...	...	...
	20	1 17	1 15	1 14	1 12	1 11	1 09	1 08	1 06	1 05	1 04	1 03	1 02	1 01
	21	1 59	2 01	2 02	2 04	2 05	2 06	2 07	2 08	2 09	2 10	2 11	2 11	2 13
	22	2 42	2 46	2 50	2 55	2 58	3 02	3 05	3 10	3 12	3 14	3 17	3 20	3 23
	23	3 25	3 31	3 39	3 47	3 52	3 57	4 04	4 11	4 15	4 19	4 23	4 28	4 33
	24	4 08	4 18	4 28	4 39	4 45	4 53	5 02	5 12	5 17	5 22	5 28	5 35	5 43
	25	4 54	5 05	5 17	5 31	5 39	5 48	5 59	6 12	6 18	6 25	6 33	6 41	6 51
	26	5 41	5 54	6 07	6 23	6 33	6 43	6 55	7 11	7 18	7 25	7 34	7 44	7 56
	27	6 29	6 43	6 58	7 15	7 25	7 36	7 50	8 06	8 14	8 22	8 32	8 42	8 55
	28	7 19	7 33	7 48	8 05	8 15	8 27	8 40	8 57	9 05	9 13	9 23	9 34	9 47
	29	8 09	8 22	8 37	8 54	9 03	9 14	9 27	9 43	9 50	9 58	10 07	10 18	10 30
	30	8 59	9 11	9 24	9 39	9 48	9 58	10 09	10 23	10 30	10 37	10 45	10 54	11 04
Dec.	1	9 49	10 00	10 10	10 23	10 30	10 38	10 48	10 59	11 04	11 10	11 17	11 24	11 32
	2	10 39	10 47	10 55	11 04	11 10	11 16	11 23	11 31	11 35	11 39	11 44	11 49	11 55
	3	11 28	11 33	11 38	11 44	11 48	11 51	11 56	12 01	12 03	12 06	12 09	12 12	12 15
	4	12 18	12 20	12 22	12 24	12 25	12 26	12 27	12 29	12 30	12 31	12 32	12 33	12 34
	5	13 09	13 08	13 06	13 04	13 02	13 01	12 59	12 57	12 56	12 55	12 54	12 53	12 52
	6	14 02	13 57	13 51	13 45	13 42	13 38	13 33	13 27	13 25	13 22	13 19	13 15	13 11
	7	14 57	14 49	14 40	14 30	14 24	14 17	14 10	14 00	13 56	13 51	13 46	13 40	13 34
	8	15 55	15 44	15 32	15 18	15 10	15 01	14 51	14 38	14 33	14 26	14 19	14 11	14 02
	9	16 54	16 41	16 27	16 11	16 02	15 51	15 38	15 23	15 16	15 08	14 59	14 49	14 38
	10	17 55	17 41	17 25	17 08	16 58	16 46	16 33	16 16	16 08	15 59	15 49	15 38	15 25
	11	18 55	18 41	18 26	18 08	17 58	17 47	17 33	17 16	17 08	17 00	16 50	16 39	16 26
	12	19 53	19 40	19 26	19 10	19 01	18 50	18 38	18 22	18 15	18 07	17 58	17 48	17 36
	13	20 48	20 37	20 25	20 11	20 03	19 54	19 44	19 31	19 25	19 18	19 11	19 03	18 53
	14	21 39	21 30	21 21	21 11	21 05	20 58	20 49	20 40	20 35	20 30	20 24	20 18	20 11
	15	22 27	22 21	22 15	22 08	22 04	21 59	21 54	21 47	21 44	21 41	21 37	21 33	21 28
	16	23 12	23 09	23 06	23 03	23 01	22 58	22 56	22 53	22 51	22 49	22 48	22 46	22 43
	17	23 56	23 56	23 56	23 56	23 56	23 56	23 56	23 56	23 56	23 56	23 56	23 57	23 57
	18	...	...	...	...	...	...	...	...	...	...	...	...	...
	19	0 38	0 41	0 45	0 48	0 50	0 53	0 55	0 59	1 00	1 02	1 04	1 06	1 08
	20	1 21	1 27	1 33	1 40	1 44	1 49	1 54	2 00	2 03	2 07	2 10	2 14	2 19
	21	2 05	2 13	2 22	2 32	2 38	2 44	2 52	3 01	3 06	3 10	3 16	3 22	3 28
	22	2 49	3 00	3 11	3 24	3 31	3 40	3 50	4 02	4 07	4 14	4 21	4 28	4 37
	23	3 35	3 48	4 01	4 16	4 25	4 35	4 47	5 01	5 08	5 15	5 24	5 33	5 44
	24	4 23	4 37	4 52	5 08	5 18	5 29	5 42	5 58	6 06	6 14	6 23	6 34	6 46
	25	5 13	5 27	5 42	6 00	6 10	6 21	6 35	6 52	6 59	7 08	7 18	7 29	7 42
	26	6 04	6 18	6 33	6 50	7 00	7 11	7 24	7 40	7 48	7 56	8 06	8 16	8 29
	27	6 55	7 08	7 22	7 37	7 46	7 57	8 09	8 24	8 31	8 38	8 47	8 56	9 07
	28	7 46	7 57	8 09	8 23	8 30	8 39	8 50	9 02	9 08	9 14	9 21	9 29	9 38
	29	8 37	8 45	8 55	9 05	9 11	9 18	9 26	9 36	9 40	9 45	9 50	9 56	10 03
	30	9 27	9 33	9 39	9 46	9 50	9 55	10 00	10 06	10 09	10 12	10 16	10 20	10 24
	31	10 16	10 19	10 22	10 25	10 27	10 29	10 32	10 35	10 36	10 38	10 39	10 41	10 43
	32	11 06	11 06	11 05	11 05	11 04	11 04	11 03	11 03	11 02	11 02	11 02	11 01	11 01

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	0	13 34	13 44	13 55	14 08	14 15	14 23	14 33	14 45	14 50	14 56	15 03	15 11	15 19
	1	14 22	14 35	14 48	15 03	15 12	15 22	15 34	15 49	15 55	16 03	16 12	16 21	16 32
	2	15 13	15 27	15 42	15 59	16 10	16 21	16 35	16 52	16 59	17 08	17 18	17 29	17 42
	3	16 07	16 22	16 38	16 56	17 07	17 19	17 34	17 51	18 00	18 09	18 20	18 32	18 46
	4	17 02	17 17	17 33	17 51	18 02	18 14	18 29	18 46	18 55	19 04	19 14	19 26	19 40
	5	17 59	18 13	18 28	18 44	18 54	19 05	19 19	19 34	19 42	19 50	19 59	20 10	20 22
	6	18 56	19 07	19 20	19 34	19 42	19 52	20 03	20 16	20 22	20 29	20 36	20 45	20 55
	7	19 51	20 00	20 10	20 21	20 27	20 34	20 42	20 52	20 56	21 01	21 07	21 13	21 20
	8	20 46	20 51	20 57	21 04	21 08	21 12	21 17	21 23	21 26	21 29	21 32	21 36	21 40
	9	21 39	21 41	21 43	21 45	21 46	21 48	21 50	21 52	21 53	21 54	21 55	21 57	21 58
	10	22 31	22 29	22 27	22 25	22 24	22 23	22 21	22 20	22 19	22 18	22 17	22 16	22 15
	11	23 23	23 17	23 12	23 06	23 02	22 58	22 53	22 48	22 45	22 43	22 40	22 36	22 32
	12	...	...	23 57	23 47	23 41	23 35	23 27	23 18	23 14	23 09	23 04	22 58	22 52
	13	0 15	0 06	...	...	...	...	...	23 51	23 46	23 39	23 32	23 24	23 15
	14	1 08	0 57	0 45	0 31	0 23	0 14	0 04	...	...	...	...	23 56	23 45
	15	2 02	1 48	1 34	1 18	1 08	0 58	0 45	0 30	0 23	0 15	0 06	...	...
	16	2 56	2 41	2 26	2 08	1 57	1 46	1 32	1 15	1 07	0 58	0 48	0 36	0 23
	17	3 50	3 35	3 19	3 01	2 50	2 38	2 23	2 06	1 58	1 48	1 38	1 26	1 12
	18	4 43	4 29	4 13	3 56	3 45	3 34	3 20	3 03	2 55	2 46	2 36	2 25	2 12
	19	5 34	5 21	5 08	4 52	4 42	4 32	4 20	4 05	3 58	3 50	3 41	3 31	3 20
	20	6 23	6 12	6 01	5 48	5 40	5 31	5 21	5 09	5 03	4 56	4 49	4 41	4 32
	21	7 10	7 01	6 52	6 42	6 37	6 30	6 22	6 13	6 09	6 04	5 58	5 53	5 46
	22	7 54	7 49	7 43	7 36	7 32	7 28	7 23	7 17	7 14	7 11	7 08	7 04	6 59
	23	8 37	8 35	8 32	8 29	8 27	8 25	8 23	8 20	8 19	8 17	8 16	8 14	8 12
	24	9 19	9 20	9 20	9 21	9 21	9 22	9 22	9 23	9 23	9 23	9 24	9 24	9 24
	25	10 01	10 05	10 08	10 12	10 15	10 18	10 21	10 25	10 26	10 28	10 30	10 33	10 36
	26	10 44	10 50	10 57	11 04	11 09	11 14	11 20	11 27	11 30	11 33	11 37	11 42	11 47
	27	11 27	11 36	11 46	11 57	12 03	12 10	12 19	12 29	12 34	12 39	12 45	12 51	12 59
	28	12 13	12 24	12 37	12 50	12 58	13 08	13 18	13 32	13 38	13 45	13 52	14 01	14 11
	29	13 01	13 15	13 29	13 45	13 54	14 05	14 18	14 34	14 41	14 49	14 58	15 08	15 20
Feb.	30	13 52	14 07	14 22	14 40	14 51	15 03	15 17	15 34	15 42	15 51	16 01	16 13	16 26
	31	14 46	15 01	15 17	15 35	15 46	15 58	16 13	16 31	16 39	16 48	16 59	17 11	17 24
	1	15 42	15 56	16 12	16 29	16 40	16 51	17 05	17 22	17 30	17 39	17 48	18 00	18 13
	2	16 39	16 52	17 05	17 21	17 30	17 41	17 53	18 07	18 14	18 22	18 30	18 40	18 51
	3	17 36	17 46	17 57	18 10	18 17	18 26	18 35	18 47	18 52	18 58	19 04	19 12	19 20
	4	18 32	18 40	18 47	18 56	19 01	19 07	19 13	19 21	19 25	19 29	19 33	19 38	19 44
	5	19 28	19 31	19 35	19 40	19 42	19 45	19 49	19 53	19 54	19 56	19 59	20 01	20 04
	6	20 22	20 22	20 22	20 22	20 22	20 22	20 22	20 22	20 22	20 22	20 22	20 22	20 22
	7	21 16	21 12	21 08	21 04	21 01	20 58	20 55	20 51	20 49	20 47	20 45	20 43	20 40
	8	22 10	22 03	21 55	21 46	21 41	21 36	21 29	21 22	21 18	21 14	21 10	21 05	21 00
	9	23 04	22 54	22 43	22 31	22 23	22 15	22 06	21 55	21 50	21 44	21 38	21 31	21 23
	10	23 58	23 46	23 32	23 17	23 08	22 58	22 46	22 32	22 26	22 18	22 10	22 01	21 51
	11	...	...	...	...	23 56	23 45	23 31	23 15	23 07	22 59	22 49	22 38	22 26
	12	0 53	0 38	0 23	0 06	...	...	...	...	23 55	23 46	23 36	23 24	23 11
	13	1 46	1 32	1 16	0 58	0 47	0 35	0 21	0 04	...	...	...	...	...
	14	2 39	2 25	2 09	1 51	1 41	1 29	1 15	0 58	0 50	0 41	0 31	0 20	0 06
	15	3 30	3 17	3 02	2 46	2 36	2 26	2 13	1 57	1 50	1 42	1 33	1 22	1 10
	16	4 19	4 07	3 55	3 41	3 33	3 23	3 12	2 59	2 53	2 46	2 39	2 30	2 20

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat. \ Date		0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
Date	Lat.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
		0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
Jan.	0	1 10	1 02	0 52	0 41	0 35	0 28	0 20	0 10	0 06	0 01	0 20	0 12	0 03
	1	1 57	1 46	1 34	1 20	1 12	1 03	0 52	0 40	0 34	0 27	0 20	0 12	0 03
	2	2 46	2 33	2 19	2 02	1 53	1 42	1 30	1 15	1 07	0 59	0 51	0 41	0 29
	3	3 38	3 24	3 08	2 50	2 40	2 28	2 14	1 57	1 49	1 40	1 30	1 18	1 05
	4	4 33	4 18	4 02	3 43	3 32	3 20	3 05	2 47	2 39	2 30	2 19	2 07	1 53
	5	5 29	5 15	4 59	4 41	4 31	4 19	4 05	3 48	3 39	3 30	3 20	3 09	2 55
	6	6 26	6 13	5 59	5 43	5 34	5 24	5 11	4 56	4 49	4 41	4 32	4 21	4 10
	7	7 22	7 12	7 01	6 48	6 41	6 32	6 22	6 10	6 04	5 58	5 51	5 43	5 34
	8	8 17	8 10	8 02	7 53	7 48	7 35	7 27	7 23	7 19	7 19	7 14	7 09	7 03
	9	9 11	9 07	9 03	8 59	8 56	8 53	8 49	8 45	8 43	8 41	8 38	8 35	8 32
	10	10 03	10 03	10 03	10 03	10 03	10 03	10 03	10 02	10 02	10 02	10 02	10 02	10 02
	11	10 55	10 59	11 03	11 07	11 09	11 12	11 15	11 19	11 21	11 23	11 25	11 27	11 30
	12	11 47	11 54	12 02	12 10	12 15	12 21	12 27	12 35	12 38	12 42	12 47	12 52	12 57
	13	12 40	12 50	13 01	13 13	13 20	13 28	13 37	13 49	13 54	14 00	14 07	14 14	14 22
	14	13 33	13 46	13 59	14 14	14 23	14 33	14 45	15 00	15 06	15 14	15 22	15 32	15 43
	15	14 28	14 42	14 57	15 14	15 24	15 36	15 49	16 06	16 14	16 23	16 32	16 44	16 57
	16	15 22	15 37	15 53	16 11	16 22	16 34	16 48	17 06	17 14	17 23	17 34	17 46	18 00
	17	16 16	16 30	16 46	17 04	17 15	17 27	17 41	17 58	18 06	18 15	18 25	18 37	18 50
	18	17 08	17 22	17 36	17 53	18 02	18 13	18 26	18 42	18 49	18 57	19 06	19 17	19 28
	19	17 58	18 10	18 22	18 37	18 45	18 55	19 06	19 19	19 25	19 32	19 39	19 48	19 58
	20	18 46	18 55	19 05	19 17	19 24	19 31	19 40	19 50	19 55	20 00	20 06	20 13	20 20
	21	19 31	19 38	19 45	19 54	19 58	20 04	20 10	20 17	20 21	20 24	20 29	20 33	20 38
	22	20 15	20 19	20 23	20 28	20 31	20 34	20 37	20 42	20 44	20 46	20 48	20 51	20 53
	23	20 58	20 59	21 00	21 01	21 02	21 02	21 03	21 04	21 05	21 05	21 06	21 06	21 07
	24	21 39	21 38	21 35	21 33	21 32	21 30	21 29	21 26	21 26	21 24	21 23	21 22	21 21
	25	22 21	22 17	22 12	22 06	22 02	21 59	21 54	21 49	21 47	21 44	21 41	21 38	21 34
	26	23 05	22 57	22 49	22 40	22 35	22 29	22 22	22 13	22 10	22 05	22 01	21 56	21 50
	27	23 49	23 39	23 28	23 16	23 09	23 01	22 52	22 41	22 35	22 30	22 23	22 16	22 08
	28	...	...	...	23 56	23 47	23 37	23 26	23 12	23 05	22 58	22 50	22 41	22 31
	29	0 36	0 24	0 11	...	...	...	...	23 49	23 42	23 33	23 24	23 13	23 01
Feb.	30	1 26	1 12	0 57	0 40	0 30	0 19	0 05	...	...	...	...	23 55	23 42
	31	2 18	2 03	1 47	1 29	1 19	1 06	0 52	0 35	0 26	0 17	0 07	...	...
	1	3 13	2 58	2 42	2 24	2 13	2 01	1 47	1 29	1 21	1 11	1 01	0 49	0 35
	2	4 09	3 55	3 40	3 23	3 14	3 02	2 49	2 33	2 25	2 16	2 07	1 56	1 43
	3	5 06	4 54	4 42	4 27	4 19	4 09	3 58	3 44	3 37	3 30	3 22	3 13	3 03
	4	6 03	5 54	5 44	5 33	5 27	5 20	5 11	5 01	4 56	4 51	4 45	4 38	4 31
	5	6 59	6 53	6 47	6 41	6 37	6 32	6 27	6 20	6 18	6 14	6 11	6 07	6 02
	6	7 54	7 52	7 50	7 48	7 46	7 45	7 43	7 41	7 40	7 39	7 38	7 36	7 35
	7	8 48	8 50	8 52	8 54	8 56	8 57	8 59	9 01	9 02	9 03	9 04	9 06	9 07
	8	9 42	9 47	9 53	10 00	10 04	10 09	10 14	10 20	10 23	10 26	10 29	10 33	10 38
	9	10 36	10 45	10 54	11 05	11 11	11 18	11 27	11 37	11 41	11 46	11 52	11 59	12 06
	10	11 30	11 41	11 54	12 08	12 16	12 26	12 37	12 50	12 56	13 03	13 11	13 20	13 29
	11	12 24	12 38	12 52	13 09	13 19	13 30	13 43	13 58	14 06	14 14	14 23	14 34	14 46
	12	13 18	13 33	13 49	14 07	14 17	14 29	14 43	15 00	15 08	15 17	15 27	15 39	15 52
	13	14 12	14 27	14 42	15 00	15 11	15 23	15 37	15 54	16 02	16 11	16 21	16 33	16 47
	14	15 04	15 18	15 33	15 50	16 00	16 11	16 24	16 40	16 48	16 56	17 06	17 16	17 28
	15	15 54	16 06	16 19	16 35	16 43	16 53	17 05	17 19	17 26	17 33	17 41	17 50	18 00
	16	16 42	16 52	17 03	17 16	17 23	17 31	17 40	17 52	17 57	18 03	18 10	18 17	18 25

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Feb.	15	3 30	3 17	3 02	2 46	2 36	2 26	2 13	1 57	1 50	1 42	1 33	1 22	1 10
	16	4 19	4 07	3 55	3 41	3 33	3 23	3 12	2 59	2 53	2 46	2 39	2 30	2 20
	17	5 06	4 57	4 47	4 36	4 29	4 22	4 13	4 02	3 58	3 52	3 46	3 40	3 32
	18	5 51	5 44	5 37	5 29	5 25	5 19	5 13	5 06	5 03	4 59	4 55	4 50	4 45
	19	6 34	6 30	6 26	6 22	6 19	6 17	6 13	6 09	6 07	6 05	6 03	6 00	5 58
	20	7 17	7 16	7 15	7 14	7 14	7 13	7 12	7 12	7 11	7 11	7 11	7 10	7 10
	21	7 59	8 01	8 03	8 06	8 07	8 09	8 11	8 14	8 15	8 16	8 18	8 19	8 21
	22	8 41	8 46	8 51	8 57	9 01	9 05	9 10	9 16	9 18	9 21	9 24	9 28	9 32
	23	9 24	9 32	9 40	9 49	9 55	10 01	10 09	10 17	10 22	10 26	10 31	10 37	10 43
	24	10 08	10 18	10 29	10 42	10 49	10 58	11 07	11 19	11 25	11 31	11 37	11 45	11 54
Mar.	25	10 55	11 07	11 20	11 35	11 44	11 54	12 06	12 20	12 27	12 34	12 43	12 52	13 03
	26	11 43	11 57	12 12	12 29	12 39	12 50	13 03	13 20	13 27	13 36	13 46	13 57	14 09
	27	12 34	12 49	13 04	13 22	13 33	13 45	13 59	14 16	14 25	14 34	14 44	14 56	15 09
	28	13 27	13 42	13 57	14 15	14 26	14 38	14 52	15 09	15 17	15 26	15 36	15 47	16 01
	1	14 22	14 36	14 50	15 07	15 16	15 27	15 40	15 56	16 03	16 11	16 21	16 31	16 43
	2	15 18	15 29	15 42	15 56	16 04	16 14	16 24	16 38	16 44	16 51	16 58	17 07	17 16
	3	16 14	16 23	16 32	16 43	16 49	16 56	17 05	17 15	17 19	17 24	17 30	17 36	17 43
	4	17 10	17 15	17 21	17 28	17 32	17 36	17 42	17 48	17 51	17 54	17 57	18 01	18 05
	5	18 06	18 08	18 10	18 12	18 13	18 15	18 17	18 19	18 20	18 21	18 22	18 23	18 25
	6	19 01	19 00	18 58	18 55	18 54	18 53	18 51	18 49	18 48	18 47	18 46	18 45	18 44
	7	19 57	19 52	19 46	19 39	19 35	19 31	19 26	19 20	19 18	19 15	19 12	19 08	19 04
	8	20 53	20 45	20 35	20 24	20 18	20 11	20 03	19 54	19 49	19 44	19 39	19 33	19 26
	9	21 50	21 38	21 26	21 12	21 04	20 55	20 44	20 31	20 25	20 18	20 11	20 03	19 53
	10	22 46	22 33	22 18	22 02	21 52	21 41	21 29	21 13	21 06	20 58	20 49	20 39	20 27
	11	23 42	23 27	23 11	22 54	22 43	22 32	22 18	22 01	21 53	21 44	21 34	21 23	21 10
	12	.. ..	.. ..	.. ..	23 48	23 37	23 25	23 11	22 54	22 46	22 38	22 27	22 16	22 03
	13	0 35	0 21	0 05	.. ..	.. ..	.. ..	.. ..	23 53	23 45	23 37	23 27	23 17	23 05
	14	1 27	1 14	0 59	0 42	0 33	0 21	0 08	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
	15	2 17	2 05	1 52	1 37	1 29	1 19	1 07	0 53	0 47	0 40	0 32	0 23	0 12
	16	3 04	2 54	2 43	2 31	2 24	2 16	2 07	1 56	1 51	1 45	1 38	1 31	1 23
	17	3 49	3 42	3 34	3 25	3 20	3 14	3 07	2 59	2 55	2 51	2 46	2 41	2 35
	18	4 33	4 28	4 23	4 17	4 14	4 11	4 06	4 01	3 59	3 56	3 54	3 50	3 47
	19	5 15	5 13	5 11	5 09	5 08	5 07	5 05	5 03	5 03	5 02	5 01	4 59	4 58
	20	5 57	5 58	6 00	6 01	6 02	6 03	6 04	6 05	6 06	6 07	6 08	6 08	6 09
	21	6 39	6 43	6 48	6 53	6 56	6 59	7 03	7 07	7 09	7 12	7 14	7 17	7 20
	22	7 22	7 29	7 36	7 45	7 49	7 55	8 01	8 09	8 13	8 17	8 21	8 26	8 31
	23	8 06	8 15	8 25	8 37	8 43	8 51	9 00	9 11	9 16	9 21	9 27	9 34	9 42
	24	8 52	9 03	9 15	9 30	9 38	9 47	9 58	10 12	10 18	10 25	10 33	10 41	10 52
	25	9 39	9 52	10 06	10 23	10 32	10 43	10 56	11 11	11 18	11 27	11 36	11 46	11 58
	26	10 28	10 42	10 58	11 15	11 25	11 37	11 51	12 08	12 16	12 25	12 35	12 46	12 59
	27	11 19	11 34	11 49	12 07	12 17	12 29	12 43	13 01	13 09	13 18	13 28	13 39	13 53
	28	12 12	12 26	12 40	12 58	13 07	13 19	13 32	13 48	13 56	14 04	14 14	14 25	14 37
	29	13 05	13 17	13 31	13 46	13 55	14 05	14 17	14 31	14 38	14 45	14 53	15 02	15 13
	30	13 59	14 09	14 20	14 32	14 39	14 48	14 57	15 08	15 14	15 19	15 26	15 33	15 41
	31	14 53	15 00	15 08	15 17	15 22	15 28	15 34	15 42	15 46	15 50	15 54	15 59	16 05
Apr.	1	15 48	15 51	15 56	16 00	16 03	16 06	16 10	16 14	16 16	16 18	16 20	16 23	16 26
	2	16 43	16 43	16 43	16 43	16 43	16 44	16 44	16 44	16 44	16 45	16 45	16 45	16 45

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date \ Lat.		0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
Date		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
		15	16	17	18	19	20	21	22	23	24	25	26	27
Feb.	15	15 54	16 06	16 19	16 35	16 43	16 53	17 05	17 19	17 26	17 33	17 41	17 50	18 00
	16	16 42	16 52	17 03	17 16	17 23	17 31	17 40	17 52	17 57	18 03	18 10	18 17	18 25
	17	17 28	17 35	17 44	17 53	17 59	18 05	18 12	18 20	18 24	18 29	18 33	18 39	18 45
	18	18 12	18 17	18 22	18 28	18 32	18 36	18 40	18 46	18 48	18 51	18 54	18 57	19 01
	19	18 55	18 57	18 59	19 02	19 03	19 05	19 07	19 09	19 10	19 11	19 13	19 14	19 16
	20	19 37	19 36	19 35	19 34	19 34	19 33	19 32	19 32	19 31	19 31	19 30	19 30	19 29
	21	20 19	20 15	20 11	20 07	20 04	20 02	19 58	19 54	19 53	19 51	19 48	19 46	19 43
	22	21 01	20 55	20 48	20 40	20 36	20 31	20 25	20 18	20 15	20 11	20 07	20 03	19 58
	23	21 45	21 36	21 27	21 16	21 09	21 02	20 54	20 44	20 39	20 34	20 29	20 23	20 16
	24	22 30	22 19	22 07	21 53	21 45	21 36	21 26	21 13	21 07	21 01	20 54	20 46	20 36
Mar.	25	23 18	23 05	22 51	22 35	22 25	22 15	22 02	21 47	21 40	21 33	21 24	21 14	21 03
	26	23 53	23 38	23 20	23 10	22 59	22 59	22 45	22 28	22 20	22 12	22 02	21 51	21 38
	27	0 07	0 05	0 29	0 11	0 00	23 48	23 34	23 17	23 08	22 59	22 49	22 37	22 24
	28	0 59	0 45	0 29	0 11	0 00	23 48	23 34	23 17	23 08	22 59	22 49	22 37	22 24
	1	1 53	1 39	1 24	1 06	0 56	0 44	0 31	0 14	0 06	...	...	...	...
	2	2 48	2 36	2 22	2 06	1 57	1 47	1 34	1 19	1 12	1 04	0 55	0 45	0 34
	3	3 44	3 34	3 23	3 10	3 02	2 54	2 44	2 32	2 26	2 20	2 13	2 05	1 56
	4	4 40	4 33	4 25	4 16	4 11	4 05	3 58	3 49	3 45	3 41	3 36	3 31	3 25
	5	5 36	5 32	5 28	5 24	5 21	5 18	5 14	5 10	5 08	5 05	5 03	5 00	4 57
	6	6 32	6 32	6 32	6 32	6 32	6 32	6 32	6 32	6 31	6 31	6 31	6 31	6 31
	7	7 28	7 32	7 36	7 40	7 43	7 46	7 49	7 54	7 55	7 57	8 00	8 02	8 05
	8	8 24	8 31	8 39	8 48	8 53	8 59	9 06	9 14	9 18	9 22	9 27	9 32	9 38
	9	9 20	9 31	9 42	9 54	10 02	10 10	10 20	10 32	10 38	10 44	10 51	10 58	11 07
	10	10 17	10 29	10 43	10 59	11 08	11 18	11 30	11 45	11 52	12 00	12 08	12 18	12 29
	11	11 13	11 27	11 42	11 59	12 10	12 21	12 35	12 51	12 59	13 08	13 18	13 29	13 42
	12	12 07	12 22	12 38	12 56	13 06	13 18	13 32	13 49	13 57	14 06	14 16	14 28	14 41
	13	13 00	13 15	13 30	13 47	13 57	14 08	14 22	14 38	14 46	14 54	15 04	15 15	15 27
	14	13 51	14 04	14 18	14 33	14 43	14 53	15 05	15 19	15 26	15 34	15 42	15 52	16 02
	15	14 40	14 51	15 02	15 15	15 23	15 32	15 42	15 54	16 00	16 06	16 13	16 20	16 29
	16	15 26	15 34	15 44	15 54	16 00	16 07	16 14	16 24	16 28	16 33	16 38	16 44	16 51
	17	16 10	16 16	16 22	16 30	16 34	16 38	16 44	16 50	16 53	16 56	17 00	17 04	17 08
	18	16 53	16 56	17 00	17 03	17 05	17 08	17 11	17 14	17 16	17 17	17 19	17 21	17 23
	19	17 35	17 36	17 36	17 36	17 36	17 36	17 37	17 37	17 37	17 37	17 37	17 37	17 37
	20	18 17	18 15	18 12	18 09	18 07	18 05	18 02	18 00	17 58	17 57	17 55	17 53	17 52
	21	19 00	18 54	18 49	18 42	18 38	18 34	18 29	18 23	18 20	18 17	18 14	18 10	18 06
	22	19 43	19 35	19 26	19 17	19 11	19 05	18 57	18 48	18 44	18 40	18 35	18 29	18 23
	23	20 28	20 17	20 06	19 54	19 46	19 38	19 28	19 17	19 11	19 05	18 59	18 51	18 43
	24	21 14	21 02	20 49	20 33	20 25	20 15	20 03	19 49	19 42	19 35	19 27	19 18	19 07
	25	22 02	21 49	21 34	21 17	21 07	20 56	20 43	20 27	20 19	20 11	20 02	19 51	19 39
	26	22 52	22 38	22 22	22 05	21 54	21 43	21 29	21 11	21 03	20 55	20 44	20 33	20 20
Apr.	27	23 44	23 30	23 14	22 57	22 46	22 35	22 21	22 04	21 56	21 47	21 37	21 25	21 12
	28	23 53	23 43	23 32	23 19	23 04	22 56	22 48	22 39	22 30	22 21	22 11	22 01	21 51
	29	0 37	0 24	0 09	0 05	0 04	0 35	0 24	0 10	0 04	23 57	23 49	23 41	23 30
	30	1 31	1 19	1 07	0 53	0 44	0 35	0 24	0 10	0 04	23 57	23 49	23 41	23 30
	31	2 25	2 16	2 06	1 55	1 49	1 42	1 33	1 23	1 18	1 13	1 07	1 00	0 53
	1	3 19	3 13	3 07	3 00	2 56	2 52	2 46	2 40	2 37	2 33	2 30	2 26	2 21
	2	4 14	4 12	4 09	4 07	4 05	4 04	4 02	3 59	3 58	3 57	3 55	3 54	3 52

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat. Date		0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr.	1	15 48	15 51	15 56	16 00	16 03	16 06	16 10	16 14	16 16	16 18	16 20	16 23	16 26
	2	16 43	16 43	16 43	16 43	16 43	16 44	16 44	16 44	16 44	16 45	16 45	16 45	16 45
	3	17 39	17 35	17 31	17 27	17 25	17 22	17 19	17 15	17 13	17 11	17 09	17 07	17 05
	4	18 36	18 28	18 21	18 12	18 07	18 02	17 55	17 48	17 44	17 40	17 36	17 31	17 26
	5	19 33	19 23	19 12	19 00	18 53	18 45	18 35	18 24	18 19	18 13	18 07	18 00	17 52
	6	20 32	20 19	20 06	19 50	19 41	19 31	19 19	19 05	18 59	18 51	18 43	18 34	18 23
	7	21 30	21 16	21 01	20 43	20 33	20 22	20 09	19 52	19 45	19 36	19 27	19 16	19 04
	8	22 27	22 12	21 56	21 39	21 28	21 16	21 03	20 46	20 38	20 29	20 19	20 07	19 54
	9	23 21	23 07	22 52	22 35	22 25	22 14	22 00	21 44	21 36	21 28	21 18	21 07	20 54
	10	...	...	23 46	23 31	23 22	23 12	23 00	22 45	22 39	22 31	22 22	22 13	22 02
	11	0 12	0 00	...	...	...	...	...	23 48	23 43	23 36	23 29	23 22	23 13
	12	1 01	0 50	0 39	0 26	0 19	0 10	0 00	...	...	...	...	...	...
	13	1 47	1 39	1 30	1 20	1 15	1 08	1 00	0 51	0 47	0 42	0 37	0 31	0 25
	14	2 31	2 26	2 20	2 13	2 09	2 05	2 00	1 54	1 51	1 48	1 45	1 41	1 37
	15	3 14	3 11	3 08	3 05	3 03	3 01	2 59	2 56	2 55	2 53	2 52	2 50	2 48
	16	3 56	3 56	3 56	3 57	3 57	3 57	3 58	3 58	3 58	3 58	3 58	3 59	3 59
	17	4 38	4 41	4 44	4 48	4 50	4 53	4 56	5 00	5 01	5 03	5 05	5 07	5 10
	18	5 20	5 26	5 33	5 40	5 44	5 49	5 55	6 01	6 04	6 08	6 12	6 16	6 21
	19	6 04	6 13	6 22	6 32	6 38	6 45	6 53	7 03	7 08	7 13	7 18	7 25	7 32
	20	6 49	7 00	7 12	7 25	7 33	7 42	7 52	8 05	8 11	8 17	8 24	8 33	8 42
	21	7 36	7 49	8 03	8 18	8 27	8 38	8 50	9 05	9 12	9 20	9 29	9 39	9 50
	22	8 25	8 39	8 54	9 11	9 21	9 33	9 46	10 03	10 11	10 19	10 29	10 40	10 53
	23	9 16	9 30	9 46	10 03	10 14	10 26	10 40	10 57	11 05	11 14	11 24	11 36	11 49
	24	10 07	10 21	10 36	10 54	11 04	11 16	11 29	11 46	11 54	12 02	12 12	12 23	12 36
	25	10 59	11 12	11 26	11 42	11 51	12 02	12 14	12 29	12 36	12 44	12 52	13 02	13 13
	26	11 51	12 02	12 14	12 28	12 36	12 44	12 55	13 07	13 13	13 19	13 26	13 34	13 43
	27	12 44	12 52	13 01	13 11	13 17	13 24	13 32	13 41	13 45	13 50	13 55	14 01	14 08
	28	13 36	13 41	13 47	13 53	13 57	14 01	14 06	14 12	14 15	14 18	14 21	14 25	14 29
	29	14 29	14 31	14 33	14 35	14 36	14 38	14 40	14 42	14 43	14 44	14 45	14 46	14 48
	30	15 22	15 21	15 19	15 17	15 16	15 14	15 13	15 11	15 10	15 10	15 09	15 08	15 06
May	1	16 17	16 12	16 06	16 00	15 56	15 52	15 48	15 42	15 39	15 37	15 33	15 30	15 26
	2	17 14	17 05	16 56	16 46	16 40	16 33	16 25	16 16	16 12	16 07	16 02	15 56	15 49
	3	18 13	18 01	17 49	17 35	17 27	17 18	17 07	16 54	16 49	16 42	16 35	16 27	16 17
	4	19 12	18 58	18 44	18 28	18 18	18 07	17 55	17 39	17 32	17 24	17 15	17 05	16 53
	5	20 11	19 56	19 41	19 23	19 13	19 01	18 47	18 31	18 23	18 14	18 04	17 53	17 40
	6	21 08	20 54	20 38	20 21	20 11	19 59	19 45	19 28	19 20	19 12	19 02	18 50	18 37
	7	22 03	21 49	21 35	21 19	21 10	20 59	20 46	20 31	20 23	20 15	20 06	19 56	19 44
	8	22 54	22 43	22 30	22 16	22 08	21 59	21 48	21 35	21 29	21 22	21 15	21 06	20 56
	9	23 42	23 33	23 23	23 12	23 06	22 58	22 50	22 40	22 35	22 30	22 24	22 17	22 10
	10	...	...	...	...	...	23 57	23 51	23 44	23 40	23 36	23 32	23 28	23 23
	11	0 28	0 21	0 14	0 06	0 02	...	...	...	...	...	...	...	...
	12	1 11	1 08	1 04	0 59	0 57	0 54	0 51	0 47	0 45	0 43	0 40	0 38	0 35
	13	1 54	1 53	1 52	1 51	1 51	1 50	1 49	1 49	1 48	1 48	1 48	1 47	1 46
	14	2 36	2 38	2 40	2 43	2 44	2 46	2 48	2 50	2 52	2 53	2 54	2 56	2 57
	15	3 18	3 23	3 28	3 34	3 38	3 42	3 47	3 52	3 55	3 58	4 01	4 04	4 08
	16	4 01	4 09	4 17	4 27	4 32	4 38	4 45	4 54	4 58	5 03	5 08	5 13	5 19
	17	4 46	4 56	5 07	5 19	5 27	5 35	5 44	5 56	6 02	6 08	6 14	6 22	6 30
	18	5 33	5 45	5 58	6 13	6 22	6 32	6 43	6 57	7 04	7 12	7 20	7 29	7 40

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr.	1	3 19	3 13	3 07	3 00	2 56	2 52	2 46	2 40	2 37	2 33	2 30	2 26	2 21
	2	4 14	4 12	4 09	4 07	4 05	4 04	4 02	3 59	3 58	3 57	3 55	3 54	3 52
	3	5 09	5 11	5 13	5 15	5 16	5 17	5 19	5 20	5 21	5 22	5 23	5 24	5 26
	4	6 05	6 11	6 17	6 23	6 27	6 31	6 36	6 43	6 45	6 48	6 52	6 56	7 00
	5	7 03	7 12	7 21	7 32	7 38	7 45	7 54	8 04	8 08	8 13	8 19	8 26	8 33
	6	8 01	8 13	8 25	8 39	8 48	8 57	9 08	9 22	9 28	9 35	9 43	9 51	10 01
	7	9 00	9 13	9 28	9 44	9 54	10 05	10 18	10 34	10 41	10 50	10 59	11 09	11 22
	8	9 57	10 12	10 27	10 45	10 55	11 07	11 21	11 38	11 46	11 55	12 05	12 16	12 29
	9	10 53	11 07	11 22	11 40	11 50	12 02	12 15	12 32	12 40	12 49	12 58	13 09	13 22
	10	11 46	11 59	12 13	12 30	12 39	12 50	13 02	13 17	13 24	13 32	13 41	13 51	14 02
	11	12 36	12 48	13 00	13 14	13 22	13 31	13 42	13 55	14 01	14 07	14 15	14 23	14 32
	12	13 23	13 33	13 43	13 54	14 00	14 08	14 16	14 26	14 31	14 36	14 42	14 48	14 56
	13	14 08	14 15	14 22	14 31	14 35	14 41	14 47	14 54	14 57	15 01	15 05	15 10	15 15
	14	14 52	14 56	15 00	15 05	15 08	15 11	15 14	15 19	15 21	15 23	15 25	15 28	15 31
	15	15 34	15 35	15 36	15 38	15 39	15 40	15 41	15 42	15 42	15 43	15 44	15 44	15 45
	16	16 16	16 14	16 12	16 10	16 09	16 08	16 06	16 04	16 04	16 03	16 02	16 00	15 59
	17	16 58	16 54	16 49	16 43	16 40	16 37	16 33	16 28	16 25	16 23	16 20	16 17	16 14
	18	17 41	17 34	17 26	17 18	17 13	17 07	17 00	16 52	16 49	16 45	16 40	16 35	16 30
	19	18 26	18 16	18 06	17 54	17 47	17 39	17 30	17 20	17 15	17 09	17 03	16 56	16 49
	20	19 12	19 00	18 47	18 33	18 25	18 15	18 04	17 51	17 45	17 38	17 30	17 22	17 12
	21	20 00	19 46	19 32	19 16	19 06	18 55	18 43	18 27	18 20	18 12	18 03	17 53	17 41
	22	20 49	20 35	20 20	20 02	19 52	19 40	19 26	19 10	19 02	18 53	18 43	18 32	18 19
	23	21 40	21 26	21 10	20 53	20 42	20 30	20 16	19 59	19 51	19 42	19 32	19 21	19 07
	24	22 32	22 18	22 04	21 47	21 37	21 25	21 12	20 56	20 48	20 40	20 30	20 19	20 07
	25	23 24	23 12	22 59	22 44	22 35	22 25	22 13	21 59	21 52	21 45	21 37	21 27	21 16
	26	...	...	23 56	23 43	23 36	23 28	23 19	23 07	23 02	22 56	22 50	22 42	22 34
	27	0 16	0 06	...	...	...	...	...	...	...	...	...	...	23 57
	28	1 08	1 01	0 54	0 45	0 40	0 35	0 28	0 20	0 16	0 12	0 07	0 02	...
	29	2 01	1 57	1 53	1 49	1 46	1 43	1 39	1 35	1 33	1 31	1 29	1 26	1 23
	30	2 54	2 54	2 54	2 54	2 53	2 53	2 53	2 53	2 53	2 53	2 53	2 52	2 52
May	1	3 48	3 52	3 56	4 00	4 03	4 05	4 09	4 12	4 14	4 16	4 18	4 21	4 24
	2	4 44	4 51	4 59	5 08	5 13	5 18	5 25	5 33	5 37	5 41	5 45	5 50	5 56
	3	5 42	5 52	6 03	6 16	6 23	6 31	6 41	6 52	6 58	7 04	7 11	7 18	7 27
	4	6 41	6 53	7 07	7 23	7 32	7 42	7 54	8 09	8 16	8 23	8 32	8 42	8 53
	5	7 40	7 54	8 09	8 27	8 37	8 48	9 02	9 19	9 26	9 35	9 45	9 56	10 09
	6	8 38	8 53	9 09	9 26	9 37	9 49	10 02	10 19	10 27	10 36	10 46	10 58	11 11
	7	9 35	9 48	10 03	10 20	10 30	10 41	10 54	11 10	11 18	11 26	11 35	11 46	11 58
	8	10 28	10 40	10 53	11 08	11 17	11 27	11 38	11 52	11 59	12 06	12 14	12 23	12 33
	9	11 17	11 28	11 39	11 51	11 58	12 06	12 16	12 27	12 32	12 38	12 45	12 52	13 00
	10	12 04	12 12	12 20	12 30	12 35	12 41	12 48	12 57	13 00	13 05	13 09	13 15	13 20
	11	12 49	12 54	12 59	13 05	13 09	13 13	13 17	13 23	13 25	13 28	13 31	13 34	13 38
	12	13 32	13 34	13 36	13 39	13 40	13 42	13 44	13 46	13 47	13 49	13 50	13 51	13 53
	13	14 14	14 13	14 12	14 12	14 11	14 11	14 10	14 09	14 09	14 08	14 08	14 07	14 07
	14	14 56	14 52	14 49	14 44	14 42	14 39	14 36	14 32	14 30	14 28	14 26	14 24	14 21
	15	15 39	15 32	15 26	15 18	15 14	15 09	15 03	14 56	14 53	14 49	14 45	14 41	14 36
	16	16 23	16 14	16 04	15 54	15 47	15 40	15 32	15 22	15 18	15 13	15 07	15 01	14 54
	17	17 08	16 57	16 45	16 32	16 24	16 15	16 05	15 52	15 46	15 40	15 33	15 25	15 16
	18	17 56	17 43	17 29	17 13	17 04	16 54	16 42	16 27	16 20	16 12	16 03	15 54	15 42

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May	17	4 46	4 56	5 07	5 19	5 27	5 35	5 44	5 56	6 02	6 08	6 14	6 22	6 30
	18	5 33	5 45	5 58	6 13	6 22	6 32	6 43	6 57	7 04	7 12	7 20	7 29	7 40
	19	6 22	6 35	6 50	7 07	7 16	7 28	7 41	7 57	8 05	8 13	8 23	8 33	8 46
	20	7 12	7 26	7 42	8 00	8 10	8 22	8 36	8 53	9 01	9 10	9 20	9 32	9 45
	21	8 04	8 18	8 34	8 51	9 02	9 13	9 27	9 44	9 52	10 01	10 11	10 23	10 36
	22	8 56	9 10	9 24	9 41	9 50	10 01	10 14	10 30	10 37	10 45	10 54	11 04	11 16
	23	9 48	10 00	10 13	10 27	10 35	10 45	10 56	11 09	11 16	11 22	11 30	11 39	11 48
	24	10 40	10 49	10 59	11 11	11 17	11 25	11 34	11 44	11 49	11 54	12 00	12 07	12 14
	25	11 31	11 38	11 45	11 53	11 57	12 02	12 08	12 15	12 19	12 22	12 26	12 30	12 35
	26	12 23	12 26	12 29	12 33	12 35	12 38	12 41	12 44	12 46	12 48	12 50	12 52	12 54
	27	13 14	13 14	13 13	13 13	13 13	13 13	13 13	13 12	13 12	13 12	13 12	13 12	13 12
	28	14 06	14 03	13 59	13 54	13 52	13 49	13 45	13 41	13 40	13 38	13 35	13 33	13 30
	29	15 00	14 53	14 46	14 37	14 32	14 27	14 20	14 12	14 09	14 05	14 01	13 56	13 51
	30	15 57	15 46	15 35	15 23	15 16	15 08	14 59	14 47	14 42	14 37	14 30	14 23	14 15
	31	16 54	16 42	16 28	16 13	16 04	15 54	15 42	15 28	15 22	15 14	15 06	14 57	14 46
June	1	17 53	17 39	17 24	17 07	16 57	16 45	16 32	16 16	16 08	15 59	15 50	15 39	15 27
	2	18 52	18 37	18 22	18 04	17 53	17 41	17 27	17 10	17 02	16 53	16 43	16 32	16 19
	3	19 49	19 35	19 20	19 03	18 53	18 41	18 28	18 11	18 04	17 55	17 46	17 35	17 22
	4	20 43	20 30	20 17	20 02	19 53	19 43	19 31	19 16	19 09	19 02	18 54	18 44	18 33
	5	21 33	21 23	21 12	21 00	20 52	20 44	20 34	20 23	20 17	20 11	20 04	19 57	19 48
	6	22 21	22 14	22 05	21 56	21 50	21 44	21 37	21 28	21 24	21 20	21 15	21 10	21 03
	7	23 06	23 02	22 56	22 50	22 47	22 43	22 38	22 33	22 31	22 28	22 25	22 21	22 18
	8	23 50	23 48	23 46	23 43	23 42	23 40	23 38	23 36	23 35	23 34	23 33	23 32	23 30
	9	0 32	0 33	0 34	0 35	0 36	0 37	0 38	0 39	0 39	0 40	0 40	0 41	0 42
	10	1 14	1 18	1 22	1 27	1 30	1 33	1 36	1 41	1 43	1 45	1 47	1 50	1 53
	11	2 04	2 08	2 12	2 17	2 20	2 23	2 26	2 31	2 33	2 35	2 37	2 40	2 43
	12	2 57	2 59	3 00	3 03	3 05	3 07	3 10	3 14	3 16	3 18	3 20	3 22	3 24
	13	3 41	3 43	3 45	3 47	3 49	3 51	3 53	3 56	3 58	3 59	4 01	4 03	4 05
	14	4 25	4 27	4 29	4 31	4 33	4 35	4 37	4 40	4 42	4 44	4 46	4 48	4 50
	15	5 09	5 11	5 13	5 15	5 17	5 19	5 21	5 24	5 26	5 28	5 30	5 32	5 34
	16	5 53	5 55	5 57	5 59	6 01	6 03	6 05	6 08	6 10	6 12	6 14	6 16	6 18
	17	6 37	6 39	6 41	6 43	6 45	6 47	6 49	6 52	6 54	6 56	6 58	6 60	6 62
	18	7 21	7 23	7 25	7 27	7 29	7 31	7 33	7 36	7 38	7 40	7 42	7 44	7 46
	19	8 05	8 07	8 09	8 11	8 13	8 15	8 17	8 20	8 22	8 24	8 26	8 28	8 30
	20	8 49	8 51	8 53	8 55	8 57	8 59	9 01	9 04	9 06	9 08	9 10	9 12	9 14
	21	9 33	9 35	9 37	9 39	9 41	9 43	9 45	9 48	9 50	9 52	9 54	9 56	9 58
	22	10 17	10 19	10 21	10 23	10 25	10 27	10 29	10 32	10 34	10 36	10 38	10 40	10 42
	23	11 01	11 03	11 05	11 07	11 09	11 11	11 13	11 16	11 18	11 20	11 22	11 24	11 26
	24	11 45	11 47	11 49	11 51	11 53	11 55	11 57	11 60	11 62	11 64	11 66	11 68	11 70
	25	12 29	12 31	12 33	12 35	12 37	12 39	12 41	12 44	12 46	12 48	12 50	12 52	12 54
	26	13 13	13 15	13 17	13 19	13 21	13 23	13 25	13 28	13 30	13 32	13 34	13 36	13 38
	27	13 57	13 59	14 01	14 03	14 05	14 07	14 09	14 12	14 14	14 16	14 18	14 20	14 22
	28	14 41	14 43	14 45	14 47	14 49	14 51	14 53	14 56	14 58	15 00	15 02	15 04	15 06
	29	15 25	15 27	15 29	15 31	15 33	15 35	15 37	15 40	15 42	15 44	15 46	15 48	15 50
	30	16 09	16 11	16 13	16 15	16 17	16 19	16 21	16 24	16 26	16 28	16 30	16 32	16 34
July	1	16 53	16 55	16 57	16 59	17 01	17 03	17 05	17 08	17 10	17 12	17 14	17 16	17 18
	2	17 37	17 39	17 41	17 43	17 45	17 47	17 49	17 52	17 54	17 56	17 58	18 00	18 02

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May	17	17 08	16 57	16 45	16 32	16 24	16 15	16 05	15 52	15 46	15 40	15 33	15 25	15 16
	18	17 56	17 43	17 29	17 13	17 04	16 54	16 42	16 27	16 20	16 12	16 03	15 54	15 42
	19	18 46	18 31	18 16	17 59	17 49	17 37	17 24	17 07	17 00	16 51	16 41	16 30	16 18
	20	19 37	19 22	19 07	18 49	18 38	18 26	18 12	17 55	17 47	17 38	17 28	17 16	17 03
	21	20 29	20 15	20 00	19 42	19 32	19 20	19 07	18 50	18 42	18 33	18 24	18 12	17 59
	22	21 21	21 08	20 54	20 39	20 30	20 19	20 07	19 52	19 44	19 37	19 28	19 18	19 06
	23	22 13	22 02	21 51	21 38	21 30	21 21	21 11	20 58	20 53	20 46	20 39	20 31	20 21
	24	23 04	22 56	22 48	22 38	22 32	22 26	22 18	22 09	22 04	22 00	21 54	21 48	21 42
	25	23 56	23 51	23 45	23 39	23 36	23 32	23 27	23 21	23 19	23 16	23 13	23 09	23 05
	26	...	...	...	...	...	...	...	...	...	...	...	...	...
	27	0 47	0 45	0 44	0 42	0 41	0 39	0 38	0 36	0 35	0 34	0 33	0 32	0 31
	28	1 39	1 41	1 43	1 45	1 47	1 48	1 50	1 52	1 53	1 54	1 56	1 57	1 59
	29	2 32	2 37	2 43	2 50	2 54	2 58	3 04	3 10	3 13	3 16	3 19	3 23	3 27
	30	3 27	3 36	3 45	3 56	4 02	4 09	4 18	4 27	4 32	4 37	4 43	4 49	4 57
	31	4 24	4 35	4 48	5 02	5 10	5 20	5 31	5 44	5 50	5 57	6 05	6 13	6 23
June	1	5 22	5 36	5 50	6 07	6 17	6 28	6 41	6 57	7 04	7 12	7 22	7 32	7 44
	2	6 21	6 36	6 51	7 09	7 19	7 31	7 45	8 02	8 10	8 19	8 29	8 41	8 54
	3	7 19	7 34	7 49	8 07	8 17	8 28	8 42	8 59	9 07	9 15	9 25	9 36	9 49
	4	8 15	8 28	8 42	8 58	9 08	9 18	9 31	9 46	9 53	10 01	10 10	10 19	10 31
	5	9 07	9 19	9 31	9 45	9 53	10 02	10 12	10 25	10 31	10 37	10 44	10 52	11 02
	6	9 57	10 06	10 15	10 26	10 32	10 39	10 47	10 57	11 02	11 07	11 12	11 18	11 25
	7	10 43	10 49	10 56	11 04	11 08	11 13	11 19	11 25	11 28	11 32	11 35	11 40	11 44
	8	11 27	11 31	11 34	11 39	11 41	11 44	11 47	11 50	11 52	11 54	11 56	11 58	12 00
	9	12 10	12 11	12 11	12 12	12 12	12 13	12 13	12 13	12 14	12 14	12 14	12 15	12 15
	10	12 52	12 50	12 47	12 45	12 43	12 41	12 39	12 36	12 35	12 34	12 32	12 31	12 29
	11	13 35	13 30	13 24	13 18	13 14	13 10	13 05	13 00	12 57	12 54	12 51	12 48	12 44
	12	14 18	14 10	14 02	13 52	13 47	13 41	13 33	13 25	13 21	13 16	13 12	13 06	13 00
	13	15 03	14 53	14 42	14 29	14 22	14 14	14 04	13 53	13 48	13 42	13 35	13 28	13 20
	14	15 50	15 38	15 24	15 10	15 01	14 51	14 39	14 25	14 19	14 12	14 04	13 55	13 44
	15	16 39	16 25	16 11	15 54	15 44	15 33	15 20	15 04	14 56	14 48	14 39	14 28	14 16
	16	17 30	17 16	17 00	16 42	16 32	16 20	16 06	15 49	15 41	15 32	15 22	15 10	14 57
	17	18 23	18 08	17 53	17 35	17 25	17 13	16 59	16 42	16 34	16 25	16 15	16 03	15 50
	18	19 16	19 03	18 48	18 32	18 22	18 11	17 58	17 42	17 35	17 26	17 17	17 07	16 54
	19	20 09	19 58	19 45	19 31	19 23	19 13	19 02	18 49	18 42	18 35	18 27	18 18	18 08
	20	21 02	20 53	20 43	20 32	20 25	20 18	20 09	19 59	19 54	19 49	19 43	19 36	19 28
	21	21 53	21 47	21 41	21 33	21 29	21 24	21 19	21 12	21 08	21 05	21 01	20 57	20 52
	22	22 44	22 42	22 39	22 35	22 33	22 31	22 29	22 26	22 24	22 23	22 21	22 19	22 17
	23	23 35	23 36	23 37	23 38	23 38	23 39	23 40	23 40	23 41	23 41	23 42	23 42	23 43
	24	...	...	...	...	...	...	...	...	...	...	...	...	...
	25	0 27	0 31	0 36	0 41	0 44	0 47	0 51	0 56	0 58	1 01	1 03	1 06	1 09
	26	1 20	1 27	1 35	1 45	1 50	1 56	2 03	2 12	2 16	2 20	2 25	2 30	2 36
	27	2 14	2 25	2 36	2 49	2 56	3 05	3 15	3 27	3 32	3 38	3 45	3 53	4 02
	28	3 10	3 23	3 37	3 53	4 02	4 12	4 24	4 39	4 46	4 54	5 02	5 12	5 23
	29	4 08	4 22	4 37	4 55	5 05	5 16	5 30	5 47	5 54	6 03	6 13	6 24	6 37
	30	5 05	5 20	5 35	5 53	6 04	6 16	6 29	6 47	6 54	7 03	7 13	7 25	7 38
July	1	6 02	6 16	6 30	6 47	6 57	7 09	7 22	7 38	7 45	7 54	8 03	8 14	8 26
	2	6 56	7 08	7 21	7 36	7 45	7 55	8 07	8 20	8 27	8 34	8 42	8 51	9 01

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July	1	6 02	6 16	6 30	6 47	6 57	7 09	7 22	7 38	7 45	7 54	8 03	8 14	8 26
	2	6 56	7 08	7 21	7 36	7 45	7 55	8 07	8 20	8 27	8 34	8 42	8 51	9 01
	3	7 47	7 57	8 08	8 20	8 28	8 36	8 45	8 56	9 01	9 07	9 13	9 21	9 29
	4	8 35	8 43	8 51	9 00	9 06	9 11	9 18	9 27	9 30	9 35	9 39	9 44	9 50
	5	9 21	9 26	9 31	9 37	9 40	9 44	9 48	9 53	9 56	9 58	10 01	10 04	10 07
	6	10 05	10 07	10 09	10 11	10 12	10 14	10 15	10 17	10 18	10 19	10 20	10 22	10 23
	7	10 48	10 47	10 46	10 44	10 44	10 43	10 42	10 41	10 40	10 39	10 39	10 38	10 37
	8	11 30	11 26	11 22	11 17	11 15	11 12	11 08	11 04	11 02	11 00	10 57	10 55	10 52
	9	12 13	12 06	11 59	11 51	11 47	11 41	11 35	11 28	11 25	11 21	11 17	11 13	11 07
	10	12 57	12 48	12 38	12 27	12 21	12 13	12 05	11 55	11 50	11 45	11 39	11 33	11 26
	11	13 43	13 31	13 19	13 05	12 57	12 48	12 38	12 25	12 19	12 12	12 05	11 57	11 47
	12	14 31	14 17	14 03	13 47	13 38	13 28	13 15	13 00	12 53	12 45	12 36	12 27	12 15
	13	15 21	15 07	14 51	14 34	14 24	14 12	13 59	13 42	13 34	13 25	13 16	13 05	12 52
	14	16 13	15 58	15 43	15 25	15 15	15 03	14 49	14 31	14 23	14 14	14 04	13 53	13 39
	15	17 06	16 53	16 38	16 20	16 10	15 59	15 45	15 29	15 21	15 13	15 03	14 52	14 39
	16	18 01	17 48	17 35	17 19	17 11	17 00	16 48	16 34	16 27	16 19	16 11	16 01	15 50
	17	18 55	18 44	18 34	18 21	18 14	18 06	17 56	17 44	17 39	17 32	17 26	17 18	17 09
	18	19 48	19 41	19 33	19 24	19 19	19 13	19 06	18 58	18 54	18 50	18 45	18 40	18 34
	19	20 40	20 37	20 32	20 27	20 25	20 21	20 18	20 13	20 11	20 09	20 06	20 03	20 00
	20	21 32	21 32	21 32	21 31	21 31	21 30	21 30	21 29	21 29	21 29	21 28	21 28	21 27
	21	22 24	22 28	22 31	22 35	22 37	22 39	22 42	22 45	22 47	22 49	22 50	22 52	22 55
	22	23 17	23 23	23 30	23 38	23 43	23 48	23 54						
	23	...	...	...	...	...	...	...	0 01	0 04	0 08	0 12	0 17	0 22
	24	0 10	0 20	0 30	0 42	0 48	0 56	1 05	1 16	1 21	1 26	1 32	1 39	1 47
	25	1 05	1 17	1 30	1 44	1 53	2 03	2 14	2 28	2 34	2 41	2 49	2 59	3 09
	26	2 01	2 14	2 29	2 46	2 56	3 07	3 20	3 36	3 43	3 52	4 01	4 12	4 24
	27	2 57	3 11	3 27	3 44	3 55	4 07	4 20	4 37	4 45	4 54	5 04	5 15	5 28
	28	3 52	4 07	4 22	4 39	4 49	5 01	5 14	5 31	5 39	5 47	5 57	6 08	6 21
	29	4 46	5 00	5 14	5 29	5 39	5 49	6 01	6 16	6 23	6 31	6 40	6 49	7 00
	30	5 38	5 50	6 02	6 15	6 23	6 32	6 42	6 55	7 00	7 07	7 14	7 22	7 31
Aug.	31	6 28	6 37	6 46	6 57	7 03	7 10	7 18	7 27	7 32	7 36	7 42	7 48	7 55
	1	7 15	7 21	7 27	7 34	7 39	7 43	7 49	7 55	7 58	8 02	8 05	8 09	8 14
	2	7 59	8 03	8 06	8 10	8 12	8 15	8 17	8 21	8 22	8 24	8 26	8 28	8 30
	3	8 43	8 43	8 44	8 44	8 44	8 44	8 44	8 45	8 45	8 45	8 45	8 45	8 45
	4	9 26	9 23	9 20	9 17	9 15	9 13	9 11	9 08	9 07	9 05	9 04	9 02	9 00
	5	10 08	10 03	9 57	9 51	9 47	9 43	9 38	9 32	9 29	9 26	9 23	9 19	9 15
	6	10 52	10 44	10 35	10 25	10 20	10 14	10 06	9 57	9 53	9 49	9 44	9 38	9 32
	7	11 36	11 26	11 15	11 02	10 55	10 47	10 37	10 26	10 20	10 14	10 08	10 01	9 52
	8	12 23	12 10	11 57	11 42	11 34	11 24	11 12	10 58	10 52	10 45	10 37	10 28	10 17
	9	13 11	12 57	12 43	12 26	12 16	12 05	11 52	11 36	11 29	11 21	11 11	11 01	10 49
	10	14 01	13 47	13 32	13 14	13 04	12 52	12 38	12 21	12 13	12 05	11 55	11 43	11 30
	11	14 54	14 40	14 24	14 07	13 57	13 45	13 31	13 14	13 07	12 58	12 48	12 37	12 24
	12	15 48	15 34	15 20	15 04	14 55	14 44	14 31	14 16	14 08	14 00	13 51	13 41	13 29
	13	16 42	16 31	16 19	16 05	15 57	15 47	15 36	15 23	15 17	15 10	15 03	14 54	14 44
	14	17 36	17 28	17 19	17 08	17 02	16 55	16 46	16 36	16 32	16 27	16 21	16 15	16 07
	15	18 31	18 25	18 19	18 13	18 09	18 04	17 59	17 53	17 50	17 47	17 43	17 39	17 35
	16	19 24	19 22	19 20	19 18	19 16	19 15	19 13	19 11	19 10	19 08	19 07	19 06	19 04
	17	20 18	20 20	20 21	20 23	20 25	20 26	20 27	20 29	20 30	20 31	20 32	20 33	20 34

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Lat.		0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
Date														
Aug.	16	h m 6 59	h m 7 02	h m 7 06	h m 7 11	h m 7 14	h m 7 16	h m 7 20	h m 7 24	h m 7 26	h m 7 28	h m 7 30	h m 7 32	h m 7 35
	17	7 53	7 53	7 53	7 53	7 53	7 53	7 54	7 54	7 54	7 54	7 54	7 54	7 54
	18	8 46	8 43	8 39	8 35	8 33	8 30	8 27	8 24	8 22	8 20	8 18	8 16	8 14
	19	9 40	9 33	9 26	9 18	9 13	9 08	9 02	8 55	8 51	8 48	8 44	8 39	8 34
	20	10 35	10 25	10 15	10 03	9 56	9 49	9 40	9 29	9 24	9 19	9 13	9 06	8 58
	21	11 30	11 18	11 05	10 51	10 42	10 32	10 21	10 08	10 01	9 54	9 46	9 38	9 28
	22	12 26	12 12	11 58	11 41	11 31	11 20	11 08	10 52	10 45	10 36	10 27	10 17	10 05
	23	13 22	13 07	12 52	12 34	12 24	12 13	11 59	11 42	11 34	11 26	11 16	11 05	10 52
	24	14 16	14 02	13 47	13 30	13 20	13 09	12 55	12 39	12 31	12 23	12 13	12 02	11 50
	25	15 09	14 56	14 42	14 27	14 17	14 07	13 55	13 40	13 33	13 25	13 17	13 07	12 56
	26	15 59	15 48	15 37	15 23	15 16	15 07	14 57	14 44	14 38	14 32	14 25	14 16	14 07
	27	16 47	16 39	16 30	16 19	16 13	16 07	15 59	15 49	15 45	15 40	15 34	15 28	15 21
	28	17 34	17 28	17 22	17 15	17 11	17 06	17 00	16 54	16 51	16 48	16 44	16 40	16 36
	29	18 18	18 15	18 12	18 09	18 06	18 04	18 01	17 58	17 57	17 55	17 53	17 51	17 49
	30	19 01	19 01	19 01	19 01	19 01	19 01	19 01	19 02	19 02	19 02	19 02	19 02	19 02
Sept.	31	19 44	19 47	19 50	19 54	19 56	19 58	20 01	20 04	20 06	20 07	20 09	20 11	20 13
	1	20 27	20 33	20 39	20 46	20 50	20 54	21 00	21 06	21 09	21 12	21 16	21 20	21 24
	2	21 10	21 19	21 27	21 37	21 43	21 50	21 58	22 07	22 11	22 16	22 21	22 27	22 34
	3	21 55	22 05	22 16	22 29	22 37	22 45	22 55	23 07	23 13	23 19	23 26	23 34	23 43
	4	22 41	22 53	23 06	23 21	23 30	23 40	23 52	...	...	...	...	...	...
	5	23 29	23 42	23 57	...	...	...	...	0 07	0 13	0 21	0 29	0 39	0 49
	6	...	...	...	0 13	0 23	0 34	0 47	1 04	1 11	1 19	1 29	1 40	1 52
	7	0 18	0 32	0 48	1 05	1 15	1 27	1 40	1 57	2 05	2 14	2 24	2 35	2 48
	8	1 09	1 23	1 38	1 56	2 06	2 17	2 30	2 47	2 54	3 03	3 13	3 23	3 36
	9	2 02	2 15	2 29	2 45	2 54	3 04	3 17	3 32	3 39	3 46	3 55	4 05	4 16
	10	2 55	3 07	3 18	3 32	3 40	3 49	3 59	4 11	4 17	4 24	4 31	4 39	4 48
	11	3 49	3 58	4 07	4 17	4 23	4 30	4 38	4 47	4 52	4 57	5 02	5 08	5 14
	12	4 44	4 49	4 55	5 01	5 05	5 09	5 14	5 20	5 23	5 26	5 29	5 33	5 37
	13	5 38	5 40	5 42	5 45	5 46	5 47	5 49	5 51	5 52	5 53	5 54	5 56	5 57
	14	6 33	6 32	6 30	6 28	6 27	6 25	6 24	6 22	6 21	6 20	6 19	6 18	6 17
	15	7 29	7 24	7 18	7 12	7 08	7 04	6 59	6 54	6 51	6 48	6 45	6 42	6 38
	16	8 25	8 17	8 08	7 58	7 52	7 45	7 37	7 28	7 24	7 19	7 14	7 08	7 02
	17	9 23	9 11	8 59	8 46	8 38	8 29	8 19	8 06	8 00	7 54	7 47	7 39	7 30
	18	10 20	10 07	9 53	9 37	9 28	9 17	9 05	8 50	8 43	8 35	8 26	8 17	8 06
	19	11 17	11 03	10 48	10 30	10 20	10 09	9 56	9 39	9 32	9 23	9 13	9 03	8 50
Oct.	20	12 12	11 58	11 43	11 26	11 16	11 04	10 51	10 35	10 27	10 18	10 09	9 58	9 45
	21	13 06	12 52	12 38	12 22	12 13	12 02	11 50	11 35	11 27	11 20	11 11	11 01	10 49
	22	13 56	13 45	13 33	13 19	13 11	13 01	12 51	12 37	12 31	12 25	12 17	12 08	11 59
	23	14 45	14 36	14 26	14 15	14 08	14 01	13 52	13 41	13 37	13 31	13 25	13 19	13 11
	24	15 31	15 25	15 17	15 09	15 05	14 59	14 53	14 46	14 42	14 39	14 34	14 30	14 24
	25	16 16	16 12	16 08	16 03	16 00	15 57	15 54	15 49	15 47	15 45	15 43	15 40	15 37
	26	16 59	16 58	16 57	16 56	16 55	16 54	16 53	16 52	16 52	16 51	16 51	16 50	16 49
	27	17 42	17 44	17 46	17 48	17 49	17 51	17 53	17 55	17 56	17 57	17 58	17 59	18 01
	28	18 25	18 29	18 34	18 40	18 43	18 47	18 51	18 57	18 59	19 02	19 05	19 08	19 12
	29	19 08	19 15	19 23	19 32	19 37	19 43	19 50	19 58	20 02	20 06	20 11	20 16	20 22
	30	19 52	20 01	20 12	20 24	20 30	20 38	20 48	20 59	21 04	21 09	21 16	21 23	21 31
	1	20 37	20 49	21 01	21 15	21 24	21 33	21 44	21 58	22 04	22 11	22 19	22 28	22 38
	2	21 24	21 37	21 51	22 07	22 16	22 27	22 40	22 55	23 02	23 10	23 19	23 30	23 41

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date		Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
			h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug.	16		19 24	19 22	19 20	19 18	19 16	19 15	19 13	19 11	19 10	19 08	19 07	19 06	19 04
	17		20 18	20 20	20 21	20 23	20 25	20 26	20 27	20 29	20 30	20 31	20 32	20 33	20 34
	18		21 12	21 17	21 22	21 29	21 32	21 37	21 41	21 47	21 50	21 53	21 56	22 00	22 04
	19		22 06	22 15	22 24	22 34	22 40	22 47	22 54	23 04	23 08	23 13	23 18	23 25	23 31
	20		23 01	23 12	23 24	23 38	23 46	23 55	...	...	...	...	...	...	...
	21		23 57	...	...	...	...	0 05	0 18	0 24	0 30	0 38	0 46	0 55	
	22		...	0 10	0 24	0 40	0 49	1 00	1 12	1 28	1 35	1 43	1 52	2 02	2 13
	23		0 53	1 07	1 22	1 39	1 49	2 01	2 14	2 31	2 39	2 47	2 57	3 08	3 21
	24		1 48	2 02	2 17	2 35	2 45	2 56	3 10	3 27	3 34	3 43	3 53	4 04	4 16
	25		2 41	2 55	3 09	3 26	3 35	3 46	3 59	4 14	4 21	4 29	4 38	4 48	5 00
	26		3 33	3 45	3 58	4 12	4 20	4 30	4 41	4 54	5 00	5 07	5 15	5 23	5 33
	27		4 23	4 32	4 43	4 54	5 01	5 09	5 18	5 28	5 33	5 39	5 45	5 51	5 59
	28		5 10	5 17	5 25	5 33	5 38	5 44	5 50	5 58	6 01	6 05	6 09	6 14	6 19
	29		5 55	5 59	6 04	6 09	6 12	6 16	6 20	6 24	6 26	6 29	6 31	6 34	6 37
	30		6 39	6 41	6 42	6 44	6 45	6 46	6 47	6 49	6 49	6 50	6 51	6 52	6 53
Sept.	31		7 22	7 21	7 19	7 17	7 16	7 15	7 14	7 12	7 12	7 11	7 10	7 09	7 08
	1		8 05	8 00	7 56	7 51	7 48	7 44	7 41	7 36	7 34	7 32	7 29	7 26	7 23
	2		8 48	8 41	8 34	8 25	8 20	8 15	8 09	8 01	7 58	7 54	7 49	7 45	7 40
	3		9 32	9 22	9 12	9 01	8 55	8 47	8 39	8 28	8 23	8 18	8 12	8 06	7 58
	4		10 17	10 05	9 53	9 39	9 31	9 22	9 12	8 59	8 53	8 46	8 39	8 31	8 21
	5		11 04	10 51	10 37	10 21	10 12	10 01	9 49	9 34	9 27	9 19	9 11	9 01	8 50
	6		11 52	11 38	11 23	11 06	10 56	10 45	10 31	10 15	10 07	9 59	9 49	9 39	9 26
	7		12 43	12 28	12 13	11 56	11 46	11 34	11 20	11 03	10 56	10 47	10 37	10 26	10 13
	8		13 34	13 21	13 06	12 49	12 40	12 29	12 15	11 59	11 52	11 43	11 34	11 23	11 11
	9		14 27	14 15	14 02	13 47	13 38	13 29	13 17	13 03	12 56	12 48	12 40	12 31	12 20
	10		15 21	15 11	15 01	14 48	14 41	14 33	14 23	14 12	14 07	14 01	13 54	13 47	13 38
	11		16 15	16 08	16 01	15 52	15 47	15 41	15 34	15 26	15 23	15 18	15 14	15 09	15 03
	12		17 10	17 06	17 02	16 57	16 55	16 52	16 48	16 44	16 42	16 40	16 37	16 35	16 32
	13		18 04	18 04	18 04	18 04	18 04	18 04	18 04	18 03	18 03	18 03	18 03	18 03	18 03
	14		19 00	19 03	19 07	19 11	19 14	19 17	19 20	19 24	19 26	19 27	19 30	19 32	19 35
	15		19 56	20 03	20 10	20 19	20 24	20 29	20 36	20 44	20 48	20 52	20 56	21 01	21 07
	16		20 53	21 03	21 13	21 26	21 33	21 41	21 50	22 02	22 07	22 13	22 20	22 27	22 35
	17		21 50	22 02	22 15	22 31	22 39	22 49	23 01	23 16	23 22	23 30	23 38	23 47	23 58
	18		22 47	23 01	23 16	23 32	23 42	23 54	...	...	...	...	...	...	...
	19		23 43	23 58	...	...	...	...	0 07	0 23	0 30	0 39	0 48	0 59	1 11
Oct.	20		...	...	0 13	0 30	0 40	0 52	1 05	1 22	1 29	1 38	1 48	1 59	2 11
	21		0 38	0 52	1 06	1 23	1 33	1 44	1 56	2 12	2 19	2 28	2 37	2 47	2 59
	22		1 30	1 43	1 56	2 11	2 19	2 29	2 41	2 54	3 01	3 08	3 16	3 25	3 35
	23		2 20	2 30	2 41	2 54	3 01	3 09	3 19	3 30	3 35	3 41	3 48	3 55	4 03
	24		3 07	3 15	3 24	3 33	3 39	3 45	3 52	4 01	4 05	4 09	4 14	4 19	4 25
	25		3 53	3 58	4 04	4 10	4 14	4 18	4 22	4 28	4 31	4 33	4 36	4 40	4 44
	26		4 37	4 39	4 42	4 45	4 46	4 48	4 50	4 53	4 54	4 55	4 57	4 58	5 00
	27		5 20	5 19	5 19	5 18	5 18	5 18	5 17	5 17	5 16	5 16	5 16	5 16	5 15
	28		6 02	5 59	5 56	5 52	5 49	5 47	5 44	5 40	5 39	5 37	5 35	5 33	5 30
	29		6 45	6 39	6 33	6 26	6 22	6 17	6 11	6 05	6 02	5 59	5 55	5 51	5 46
	30		7 29	7 20	7 11	7 01	6 55	6 48	6 41	6 31	6 27	6 22	6 17	6 11	6 05
	1		8 13	8 03	7 51	7 39	7 31	7 23	7 13	7 01	6 55	6 49	6 42	6 35	6 26
	2		8 59	8 47	8 34	8 19	8 10	8 00	7 48	7 34	7 27	7 20	7 12	7 03	6 52

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct.	1	20 37	20 49	21 01	21 15	21 24	21 33	21 44	21 58	22 04	22 11	22 19	22 28	22 38
	2	21 24	21 37	21 51	22 07	22 16	22 27	22 40	22 55	23 02	23 10	23 19	23 30	23 41
	3	22 12	22 26	22 41	22 58	23 08	23 19	23 33	23 49	23 57	...	...	...	...
	4	23 02	23 16	23 31	23 48	23 58	...	...	...	...	0 06	0 15	0 26	0 39
	5	23 52	...	...	...	...	0 09	0 23	0 40	0 47	0 56	1 06	1 17	1 29
	6	...	0 06	0 20	0 36	0 46	0 57	1 09	1 25	1 32	1 40	1 49	2 00	2 11
	7	0 44	0 56	1 08	1 23	1 31	1 41	1 52	2 06	2 12	2 19	2 27	2 35	2 45
	8	1 36	1 45	1 56	2 08	2 14	2 22	2 31	2 42	2 47	2 53	2 59	3 06	3 13
	9	2 28	2 35	2 43	2 51	2 56	3 01	3 08	3 15	3 19	3 23	3 27	3 32	3 37
	10	3 21	3 25	3 29	3 34	3 36	3 39	3 43	3 47	3 49	3 51	3 53	3 55	3 58
	11	4 16	4 16	4 16	4 16	4 16	4 17	4 17	4 17	4 17	4 18	4 18	4 18	4 18
	12	5 11	5 08	5 04	5 00	4 58	4 55	4 52	4 48	4 47	4 45	4 43	4 41	4 39
	13	6 08	6 01	5 54	5 46	5 41	5 35	5 29	5 22	5 18	5 15	5 11	5 06	5 01
	14	7 07	6 57	6 46	6 34	6 27	6 19	6 10	5 59	5 54	5 49	5 43	5 36	5 28
	15	8 06	7 54	7 41	7 26	7 17	7 07	6 56	6 42	6 35	6 28	6 20	6 11	6 01
	16	9 05	8 52	8 37	8 20	8 10	7 59	7 46	7 30	7 23	7 15	7 06	6 55	6 43
	17	10 04	9 49	9 34	9 17	9 07	8 55	8 42	8 25	8 18	8 09	7 59	7 48	7 36
	18	10 59	10 46	10 31	10 15	10 05	9 54	9 42	9 26	9 18	9 10	9 01	8 50	8 38
	19	11 52	11 40	11 28	11 13	11 04	10 55	10 43	10 29	10 23	10 16	10 08	9 58	9 48
	20	12 42	12 32	12 22	12 10	12 02	11 55	11 45	11 34	11 29	11 23	11 16	11 09	11 01
	21	13 29	13 22	13 14	13 05	13 00	12 54	12 47	12 38	12 35	12 30	12 25	12 20	12 14
	22	14 14	14 10	14 05	13 59	13 55	13 52	13 47	13 42	13 40	13 37	13 34	13 31	13 27
	23	14 58	14 56	14 54	14 52	14 50	14 49	14 47	14 45	14 44	14 43	14 42	14 41	14 39
	24	15 41	15 41	15 42	15 44	15 44	15 45	15 46	15 47	15 48	15 48	15 49	15 50	15 50
	25	16 23	16 27	16 31	16 35	16 38	16 41	16 45	16 49	16 51	16 53	16 55	16 58	17 01
	26	17 06	17 12	17 19	17 27	17 32	17 37	17 43	17 50	17 54	17 57	18 02	18 06	18 11
	27	17 50	17 59	18 08	18 19	18 25	18 33	18 41	18 51	18 56	19 01	19 07	19 14	19 21
	28	18 35	18 46	18 58	19 11	19 19	19 28	19 39	19 51	19 57	20 04	20 11	20 20	20 29
	29	19 21	19 34	19 47	20 03	20 12	20 23	20 35	20 50	20 57	21 04	21 13	21 23	21 34
	30	20 09	20 23	20 37	20 54	21 04	21 15	21 29	21 45	21 53	22 01	22 11	22 21	22 34
Nov.	31	20 58	21 12	21 27	21 44	21 54	22 06	22 20	22 36	22 44	22 53	23 02	23 14	23 27
	1	21 47	22 01	22 16	22 33	22 42	22 54	23 07	23 23	23 30	23 38	23 48	23 58	...
	2	22 38	22 50	23 04	23 19	23 28	23 38	23 50	...	...	...	...	...	0 11
	3	23 28	23 39	23 50	...	...	...	...	0 04	0 11	0 18	0 27	0 36	0 47
	4	...	...	...	0 03	0 11	0 19	0 29	0 41	0 47	0 53	1 00	1 07	1 16
	5	0 18	0 27	0 35	0 45	0 51	0 58	1 05	1 14	1 18	1 23	1 28	1 34	1 40
	6	1 09	1 15	1 20	1 27	1 30	1 34	1 39	1 45	1 48	1 50	1 54	1 57	2 01
	7	2 01	2 03	2 05	2 08	2 09	2 10	2 12	2 14	2 15	2 17	2 18	2 19	2 21
	8	2 54	2 53	2 51	2 49	2 48	2 47	2 46	2 44	2 43	2 43	2 42	2 41	2 40
	9	3 49	3 44	3 39	3 33	3 29	3 25	3 21	3 15	3 13	3 10	3 07	3 04	3 00
	10	4 46	4 38	4 29	4 19	4 13	4 07	3 59	3 50	3 46	3 41	3 36	3 31	3 24
	11	5 45	5 34	5 22	5 09	5 01	4 52	4 42	4 29	4 24	4 17	4 10	4 03	3 54
	12	6 46	6 33	6 19	6 03	5 53	5 43	5 31	5 16	5 09	5 01	4 52	4 42	4 31
	13	7 47	7 33	7 18	7 00	6 50	6 39	6 25	6 09	6 01	5 53	5 43	5 32	5 20
	14	8 46	8 32	8 17	8 00	7 50	7 39	7 25	7 09	7 01	6 53	6 43	6 32	6 20
	15	9 42	9 30	9 16	9 00	8 51	8 41	8 28	8 14	8 07	7 59	7 50	7 40	7 29
	16	10 35	10 24	10 13	10 00	9 52	9 43	9 33	9 20	9 14	9 08	9 01	8 53	8 43
	17	11 25	11 16	11 07	10 57	10 51	10 44	10 36	10 27	10 22	10 17	10 12	10 06	9 59

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date \ Lat.		0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
Oct.	1	h m 8 13	h m 8 03	h m 7 51	h m 7 39	h m 7 31	h m 7 23	h m 7 13	h m 7 01	h m 6 55	h m 6 49	h m 6 42	h m 6 35	h m 6 26
	2	8 59	8 47	8 34	8 19	8 10	8 00	7 48	7 34	7 27	7 20	7 12	7 03	6 52
	3	9 47	9 33	9 19	9 02	8 53	8 41	8 28	8 13	8 05	7 57	7 48	7 37	7 25
	4	10 36	10 22	10 06	9 49	9 39	9 28	9 14	8 57	8 50	8 41	8 31	8 20	8 07
	5	11 26	11 12	10 57	10 40	10 30	10 19	10 05	9 49	9 41	9 33	9 23	9 12	9 00
	6	12 17	12 04	11 50	11 34	11 25	11 15	11 02	10 47	10 40	10 32	10 24	10 14	10 02
	7	13 08	12 57	12 46	12 32	12 24	12 15	12 05	11 52	11 46	11 39	11 32	11 24	11 14
	8	14 01	13 52	13 43	13 33	13 27	13 20	13 12	13 02	12 57	12 52	12 47	12 40	12 33
	9	14 53	14 48	14 42	14 35	14 31	14 27	14 22	14 16	14 13	14 10	14 06	14 02	13 58
	10	15 47	15 45	15 43	15 40	15 39	15 37	15 35	15 33	15 32	15 31	15 29	15 28	15 26
	11	16 42	16 43	16 45	16 47	16 48	16 49	16 51	16 53	16 53	16 54	16 55	16 56	16 57
	12	17 38	17 43	17 49	17 55	17 59	18 03	18 08	18 14	18 16	18 19	18 23	18 26	18 30
	13	18 36	18 44	18 53	19 04	19 10	19 17	19 25	19 35	19 39	19 44	19 50	19 56	20 03
	14	19 35	19 46	19 58	20 12	20 20	20 29	20 40	20 53	20 59	21 06	21 14	21 22	21 32
	15	20 34	20 48	21 02	21 18	21 27	21 38	21 51	22 06	22 13	22 21	22 30	22 41	22 52
	16	21 33	21 48	22 03	22 20	22 30	22 41	22 55	23 11	23 19	23 28	23 37	23 48	.. .
	17	22 31	22 45	22 59	23 16	23 26	23 37	23 51	.. .	.. .	.. .	.. .	.. .	0 01
	18	23 25	23 38	23 52	.. .	.. .	.. .	.. .	0 07	0 14	0 23	0 32	0 43	0 55
	19	.. .	.. .	.. .	0 07	0 16	0 26	0 38	0 53	1 00	1 07	1 16	1 25	1 36
	20	0 17	0 28	0 39	0 53	1 00	1 09	1 19	1 31	1 37	1 43	1 50	1 58	2 07
	21	1 05	1 14	1 23	1 34	1 40	1 46	1 54	2 04	2 08	2 13	2 18	2 24	2 31
	22	1 51	1 57	2 04	2 11	2 15	2 20	2 26	2 32	2 35	2 38	2 42	2 46	2 50
	23	2 35	2 39	2 42	2 46	2 49	2 51	2 54	2 58	2 59	3 01	3 03	3 05	3 07
	24	3 18	3 19	3 19	3 20	3 20	3 21	3 21	3 21	3 22	3 22	3 22	3 22	3 23
	25	4 01	3 59	3 56	3 53	3 52	3 50	3 48	3 45	3 44	3 43	3 41	3 40	3 38
	26	4 44	4 38	4 33	4 27	4 23	4 19	4 15	4 09	4 07	4 04	4 01	3 57	3 53
	27	5 27	5 19	5 11	5 02	4 56	4 50	4 43	4 35	4 31	4 27	4 22	4 17	4 11
	28	6 11	6 01	5 51	5 38	5 31	5 23	5 14	5 03	4 58	4 52	4 46	4 39	4 31
	29	6 57	6 45	6 32	6 18	6 09	6 00	5 49	5 35	5 29	5 22	5 14	5 06	4 56
	30	7 44	7 31	7 16	7 00	6 51	6 40	6 27	6 12	6 05	5 57	5 48	5 38	5 26
	31	8 32	8 18	8 03	7 46	7 36	7 25	7 11	6 55	6 47	6 38	6 29	6 18	6 05
	1	9 22	9 08	8 52	8 35	8 25	8 14	8 00	7 44	7 36	7 27	7 17	7 06	6 54
	2	10 12	9 58	9 44	9 28	9 18	9 07	8 54	8 39	8 31	8 23	8 14	8 04	7 52
	3	11 02	10 50	10 37	10 23	10 15	10 05	9 54	9 40	9 33	9 26	9 18	9 09	8 59
	4	11 52	11 43	11 32	11 21	11 14	11 06	10 57	10 46	10 41	10 35	10 29	10 21	10 13
	5	12 43	12 36	12 29	12 20	12 15	12 10	12 03	11 55	11 52	11 48	11 43	11 39	11 33
	6	13 34	13 30	13 26	13 22	13 19	13 16	13 13	13 08	13 06	13 04	13 02	12 59	12 56
	7	14 26	14 26	14 26	14 25	14 25	14 25	14 25	14 24	14 24	14 24	14 24	14 24	14 23
	8	15 20	15 23	15 27	15 31	15 33	15 36	15 39	15 43	15 44	15 46	15 48	15 50	15 53
	9	16 16	16 23	16 30	16 38	16 43	16 49	16 55	17 02	17 06	17 10	17 14	17 19	17 24
	10	17 14	17 24	17 35	17 47	17 54	18 02	18 11	18 23	18 28	18 34	18 40	18 47	18 56
	11	18 14	18 27	18 40	18 55	19 04	19 14	19 26	19 40	19 47	19 54	20 02	20 12	20 22
	12	19 15	19 29	19 44	20 01	20 11	20 22	20 35	20 51	20 59	21 07	21 17	21 28	21 40
	13	20 15	20 30	20 45	21 02	21 12	21 24	21 37	21 54	22 01	22 10	22 20	22 31	22 43
	14	21 13	21 27	21 41	21 58	22 07	22 18	22 31	22 46	22 53	23 01	23 10	23 20	23 32
	15	22 08	22 20	22 33	22 47	22 55	23 05	23 16	23 29	23 35	23 42	23 50	23 58	.. .
	16	22 59	23 09	23 19	23 31	23 38	23 45	23 54	.. .	.. .	.. .	.. .	.. .	0 08
	17	23 47	23 55	.. .	.. .	.. .	.. .	.. .	0 05	0 10	0 15	0 21	0 28	0 35

LOCAL CIVIL TIME OF MOONRISE (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov.	16	10 35	10 24	10 13	10 00	9 52	9 43	9 33	9 20	9 14	9 08	9 01	8 53	8 43
	17	11 25	11 16	11 07	10 57	10 51	10 44	10 36	10 27	10 22	10 17	10 12	10 06	9 59
	18	12 11	12 06	11 59	11 52	11 48	11 44	11 38	11 32	11 29	11 26	11 22	11 18	11 14
	19	12 56	12 53	12 50	12 46	12 44	12 42	12 39	12 36	12 34	12 33	12 31	12 29	12 27
	20	13 39	13 39	13 39	13 39	13 39	13 39	13 38	13 39	13 38	13 39	13 39	13 39	13 39
	21	14 21	14 24	14 27	14 30	14 32	14 35	14 37	14 40	14 42	14 44	14 45	14 47	14 49
	22	15 04	15 09	15 15	15 22	15 26	15 30	15 36	15 42	15 45	15 48	15 52	15 55	16 00
	23	15 47	15 55	16 04	16 14	16 20	16 26	16 34	16 43	16 47	16 52	16 57	17 03	17 10
	24	16 32	16 42	16 53	17 06	17 13	17 22	17 32	17 44	17 49	17 55	18 02	18 10	18 19
	25	17 18	17 30	17 43	17 58	18 07	18 17	18 29	18 43	18 50	18 57	19 05	19 15	19 26
	26	18 06	18 19	18 34	18 50	19 00	19 11	19 24	19 40	19 47	19 56	20 05	20 16	20 28
	27	18 55	19 09	19 24	19 41	19 51	20 03	20 17	20 33	20 41	20 50	21 00	21 11	21 24
	28	19 45	19 59	20 14	20 31	20 41	20 52	21 06	21 22	21 30	21 38	21 48	21 59	22 11
	29	20 35	20 48	21 02	21 18	21 27	21 38	21 50	22 05	22 12	22 20	22 29	22 39	22 50
	30	21 25	21 37	21 49	22 03	22 11	22 20	22 31	22 44	22 50	22 56	23 04	23 12	23 21
Dec.	1	22 15	22 24	22 34	22 45	22 51	22 59	23 07	23 17	23 22	23 27	23 33	23 39	23 47
	2	23 05	23 11	23 18	23 26	23 30	23 35	23 41	23 48	23 51	23 55	23 59	0 03	0 08
	3	23 54	23 58	...	...	...	...	...	...	...	...	...	0 03	0 08
	4	...	...	0 01	0 05	0 08	0 10	0 13	0 17	0 19	0 20	0 22	0 25	0 27
	5	0 45	0 45	0 45	0 45	0 45	0 45	0 45	0 45	0 45	0 45	0 45	0 45	0 45
	6	1 37	1 33	1 30	1 26	1 23	1 21	1 18	1 14	1 12	1 11	1 09	1 07	1 04
	7	2 31	2 24	2 17	2 09	2 04	1 59	1 53	1 45	1 42	1 39	1 34	1 30	1 25
	8	3 27	3 17	3 07	2 55	2 48	2 40	2 32	2 21	2 16	2 11	2 04	1 58	1 50
	9	4 26	4 13	4 00	3 46	3 37	3 27	3 16	3 02	2 56	2 49	2 41	2 32	2 22
	10	5 26	5 12	4 58	4 41	4 31	4 20	4 07	3 51	3 44	3 35	3 26	3 16	3 04
	11	6 27	6 12	5 57	5 40	5 30	5 18	5 04	4 48	4 40	4 31	4 21	4 10	3 58
	12	7 26	7 12	6 58	6 41	6 31	6 20	6 07	5 51	5 44	5 35	5 26	5 15	5 03
	13	8 22	8 10	7 57	7 42	7 34	7 24	7 13	6 59	6 52	6 45	6 37	6 28	6 17
	14	9 15	9 05	8 55	8 43	8 36	8 28	8 18	8 07	8 02	7 56	7 50	7 43	7 35
	15	10 04	9 57	9 49	9 41	9 36	9 30	9 23	9 15	9 12	9 08	9 03	8 58	8 52
	16	10 51	10 46	10 42	10 37	10 34	10 30	10 26	10 22	10 19	10 17	10 14	10 11	10 08
	17	11 35	11 34	11 32	11 31	11 30	11 29	11 27	11 26	11 25	11 25	11 24	11 23	11 22
	18	12 18	12 20	12 21	12 23	12 24	12 26	12 27	12 29	12 30	12 31	12 32	12 33	12 34
	19	13 01	13 05	13 10	13 15	13 18	13 22	13 26	13 31	13 33	13 36	13 39	13 42	13 45
	20	13 44	13 51	13 58	14 07	14 12	14 17	14 24	14 32	14 36	14 40	14 45	14 50	14 55
	21	14 28	14 37	14 47	14 59	15 05	15 13	15 22	15 33	15 38	15 44	15 50	15 57	16 05
	22	15 13	15 24	15 37	15 51	15 59	16 09	16 20	16 33	16 39	16 46	16 54	17 03	17 13
	23	16 00	16 13	16 27	16 43	16 53	17 03	17 16	17 31	17 39	17 47	17 55	18 06	18 18
	24	16 49	17 03	17 18	17 35	17 45	17 57	18 10	18 27	18 35	18 43	18 53	19 04	19 17
	25	17 39	17 53	18 09	18 26	18 36	18 48	19 01	19 18	19 26	19 35	19 45	19 56	20 09
	26	18 30	18 44	18 58	19 15	19 25	19 36	19 49	20 04	20 12	20 20	20 29	20 40	20 52
	27	19 22	19 34	19 47	20 02	20 10	20 20	20 31	20 45	20 52	20 59	21 07	21 16	21 26
	28	20 12	20 23	20 33	20 46	20 53	21 01	21 10	21 21	21 26	21 32	21 38	21 46	21 53
	29	21 03	21 10	21 18	21 27	21 32	21 38	21 45	21 53	21 57	22 01	22 06	22 11	22 16
	30	21 53	21 57	22 02	22 07	22 10	22 14	22 18	22 22	22 25	22 27	22 30	22 33	22 36
	31	22 42	22 44	22 45	22 46	22 47	22 48	22 49	22 51	22 51	22 52	22 53	22 53	22 54
	32	23 33	23 31	23 28	23 26	23 24	23 23	23 21	23 19	23 17	23 16	23 15	23 14	23 12

LOCAL CIVIL TIME OF MOONSET (MOON'S UPPER LIMB)
MERIDIAN OF GREENWICH

To obtain civil time in which the designations A. M. and P. M. are used, write A. M. after the time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it and mark the result P. M.

To obtain standard time see directions on page 494.

Date	Lat.	0°	-10°	-20°	-30°	-35°	-40°	-45°	-50°	-52°	-54°	-56°	-58°	-60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov.	16	22 59	23 09	23 19	23 31	23 38	23 45	23 54	h m	h m	h m	h m	h m	h m
	17	23 47	23 55						0 05	0 10	0 15	0 21	0 28	0 35
	18			0 02	0 11	0 16	0 21	0 28	0 35	0 39	0 43	0 47	0 52	0 57
	19	0 33	0 37	0 42	0 47	0 50	0 53	0 57	1 02	1 04	1 06	1 09	1 12	1 15
	20	1 17	1 18	1 20	1 21	1 22	1 24	1 25	1 26	1 27	1 28	1 29	1 30	1 31
	21	1 59	1 58	1 56	1 55	1 54	1 53	1 51	1 50	1 49	1 49	1 48	1 47	1 46
	22	2 42	2 38	2 33	2 28	2 25	2 22	2 18	2 14	2 12	2 09	2 07	2 04	2 01
	23	3 25	3 18	3 10	3 02	2 57	2 52	2 46	2 39	2 35	2 31	2 27	2 23	2 17
	24	4 08	3 59	3 49	3 38	3 32	3 24	3 16	3 06	3 01	2 56	2 50	2 44	2 36
	25	4 54	4 42	4 30	4 17	4 09	4 00	3 49	3 36	3 30	3 24	3 17	3 08	2 59
	26	5 41	5 28	5 14	4 58	4 49	4 39	4 26	4 12	4 05	3 57	3 48	3 39	3 27
	27	6 29	6 15	6 00	5 43	5 33	5 22	5 09	4 52	4 45	4 36	4 27	4 16	4 04
	28	7 19	7 04	6 49	6 32	6 22	6 10	5 56	5 40	5 32	5 23	5 13	5 02	4 49
	29	8 09	7 55	7 40	7 24	7 14	7 03	6 49	6 33	6 26	6 17	6 08	5 57	5 44
	30	8 59	8 47	8 33	8 18	8 09	7 59	7 47	7 33	7 26	7 18	7 10	7 00	6 49
Dec.	1	9 49	9 39	9 27	9 15	9 07	8 59	8 49	8 37	8 31	8 25	8 18	8 10	8 01
	2	10 39	10 31	10 22	10 13	10 07	10 01	9 53	9 44	9 40	9 35	9 30	9 24	9 18
	3	11 28	11 23	11 18	11 12	11 09	11 05	11 00	10 54	10 52	10 49	10 46	10 42	10 38
	4	12 18	12 17	12 15	12 13	12 12	12 10	12 09	12 07	12 06	12 05	12 04	12 02	12 01
	5	13 09	13 11	13 13	13 15	13 16	13 18	13 19	13 21	13 22	13 23	13 24	13 25	13 26
	6	14 02	14 07	14 13	14 19	14 23	14 27	14 31	14 37	14 40	14 43	14 46	14 49	14 53
	7	14 57	15 05	15 14	15 25	15 31	15 37	15 45	15 55	15 59	16 04	16 09	16 15	16 22
	8	15 55	16 06	16 18	16 31	16 39	16 48	16 59	17 12	17 18	17 24	17 32	17 40	17 50
	9	16 54	17 08	17 22	17 38	17 47	17 58	18 11	18 26	18 33	18 41	18 50	19 00	19 12
	10	17 55	18 09	18 24	18 42	18 52	19 03	19 17	19 34	19 41	19 50	20 00	20 11	20 24
	11	18 55	19 09	19 24	19 41	19 51	20 03	20 16	20 32	20 40	20 48	20 58	21 09	21 21
	12	19 53	20 06	20 20	20 35	20 44	20 55	21 07	21 21	21 28	21 36	21 44	21 54	22 05
	13	20 48	20 59	21 10	21 23	21 31	21 40	21 50	22 02	22 08	22 14	22 21	22 28	22 37
	14	21 39	21 47	21 56	22 06	22 12	22 19	22 26	22 36	22 40	22 44	22 49	22 55	23 02
	15	22 27	22 32	22 38	22 45	22 49	22 53	22 58	23 05	23 07	23 10	23 14	23 17	23 22
	16	23 12	23 15	23 18	23 21	23 23	23 25	23 28	23 30	23 32	23 33	23 35	23 37	23 38
	17	23 56	23 56	23 55	23 55	23 55	23 55	23 55	23 55	23 55	23 54	23 54	23 54	23 54
	18													
	19	0 38	0 35	0 32	0 29	0 27	0 24	0 22	0 18	0 17	0 15	0 13	0 11	0 09
	20	1 21	1 15	1 09	1 03	0 59	0 54	0 49	0 43	0 40	0 37	0 33	0 29	0 25
	21	2 05	1 56	1 48	1 38	1 32	1 25	1 18	1 09	1 04	1 00	0 55	0 49	0 43
	22	2 49	2 39	2 28	2 15	2 07	1 59	1 49	1 38	1 32	1 26	1 19	1 12	1 04
	23	3 35	3 23	3 10	2 55	2 46	2 36	2 25	2 11	2 04	1 57	1 49	1 40	1 29
	24	4 23	4 10	3 55	3 39	3 29	3 18	3 05	2 49	2 42	2 34	2 24	2 14	2 02
	25	5 13	4 59	4 44	4 26	4 16	4 04	3 51	3 34	3 26	3 17	3 08	2 56	2 44
	26	6 04	5 50	5 35	5 17	5 07	4 56	4 42	4 26	4 18	4 09	4 00	3 49	3 36
	27	6 55	6 42	6 28	6 12	6 03	5 52	5 39	5 24	5 17	5 09	5 00	4 50	4 38
	28	7 46	7 35	7 23	7 09	7 01	6 52	6 41	6 28	6 22	6 15	6 07	5 59	5 49
	29	8 37	8 28	8 18	8 07	8 01	7 54	7 45	7 35	7 30	7 25	7 19	7 13	7 05
	30	9 27	9 21	9 14	9 07	9 02	8 58	8 52	8 45	8 42	8 38	8 34	8 30	8 25
	31	10 16	10 13	10 10	10 07	10 05	10 02	10 00	9 56	9 55	9 53	9 51	9 49	9 47
	32	11 06	11 07	11 07	11 08	11 08	11 08	11 09	11 09	11 10	11 10	11 10	11 10	11 11

FOR STATIONS NOT ON THE MERIDIAN OF GREENWICH

For longitudes twelve hours or less west from Greenwich obtain the data for the given latitude from the table for the given date and for the date following; for longitudes twelve hours or less east from Greenwich obtain the data for the given latitude from the table for the given date and for the date preceding. Subtract the time on the earlier date from the time on the later and multiply the difference by the twenty-fourth part of the longitude in hours and decimals of an hour, positive if west, and negative if east. Apply the product as a correction to the time on the given date. The result is the local time of the phenomenon. To obtain the standard time, increase the local time four minutes for each degree the station is west of the standard meridian, or decrease the local time four minutes for each degree the station is east of the standard meridian.

Example.—January 15, 1958, find the standard time of moonrise and moonset in longitude 145° or 9^h 40^m east from Greenwich (20 minutes west of the standard meridian) and in latitude 37° 50' south.

	d	Moonrise		Moonset	
		h	m	h	m
For Lat. -37°.8	Jan. 14	0	18	14	29
	Jan. 15	1	02	15	31
Difference			+44		+62
Product of Diff. by $-\frac{9.7}{24}$			-18		-25
Local civil time	Jan. 15	0	44	15	06
Reduction to standard time			+20		+20
Standard time	Jan. 15	1	04	15	26
		or	1 04 A. M.		3 26 P. M.

July 4, 1958, find the Eastern standard time of moonrise and moonset at Washington, D. C., longitude 77° or 5^h 8^m west, latitude 38° 55' north.

	d	Moonrise		Moonset	
		h	m	h	m
For Lat. +38°.9	July 4	21	28	8	00
	July 5	22	00	8	59
Difference			+32		+59
Product of Diff. by $+\frac{5.1}{24}$			+07		+13
Local civil time	July 4	21	35	8	13
Reduction to standard time			+ 8		+ 8
Eastern standard time	July 4	21	43	8	21
		or	9 43 P. M.		8 21 A. M.

UNIVERSAL TIME

Date	January			February			March			April			May			June		
	Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour	
d	° /	'		° /	'		° /	'		° /	'		° /	'		° /	'	
1.0	120 50	+28.4		135 35	+31.1		115 25	+31.0		135 21	+34.1		144 42	+34.9		168 00	...	
1.5	126 32	28.7		141 51	31.6		121 41	31.6		142 13	34.5		151 42	35.1		174 12	...	
2.0	132 19	29.1		148 12	32.0		128 03	32.1		149 10	34.9		158 44	35.2		176 08	...	
2.5	138 11	29.5		154 38	32.2		134 32	32.7		156 11	35.2		165 47	+35..		170 46	...	
3.0	144 07	+29.9		161 06	+32..		141 08	+33.3		163 16	+35..		172 47	...		164 28	-32..	
3.5	150 09	30.3		167 28	...		147 50	33.7		170 20	...		178 59	...		158 05	31.7	
4.0	156 14	30.5		173 11	...		154 37	34.0		177 09	...		173 05	...		151 46	31.4	
4.5	162 20	+30..		174 36	...		161 27	+34..		174 59	...		166 12	...		145 31	31.0	
5.0	168 21	...		169 39	...		168 14	...		168 01	...		159 23	-34..		139 22	-30.5	
5.5	173 43	...		163 13	-33..		174 26	...		160 59	-35..		152 39	33.4		133 18	30.1	
6.0	174 50	...		156 28	34.0		175 09	...		154 00	34.7		146 01	32.9		127 20	29.6	
6.5	170 00	...		149 38	34.2		169 09	...		147 06	34.3		139 30	32.3		121 28	29.2	
7.0	163 49	-32..		142 46	-34.3		162 19	-35..		140 17	-33.8		133 05	-31.8		115 40	-28.8	
7.5	157 20	32.7		135 55	34.1		155 21	34.8		133 35	33.2		126 48	31.2		109 57	28.4	
8.0	150 44	33.2		129 07	33.9		148 23	34.7		127 00	32.6		120 37	30.6		104 19	28.1	
8.5	144 05	33.4		122 22	33.6		141 27	34.5		120 32	32.0		114 33	30.1		98 44	27.8	
9.0	137 24	-33.5		115 41	-33.2		134 36	-34.1		114 11	-31.4		108 35	-29.6		93 12	-27.5	
9.5	130 42	33.4		109 05	32.8		127 49	33.6		107 57	30.9		102 43	29.1		87 42	27.4	
10.0	124 02	33.3		102 34	32.4		121 09	33.1		101 50	30.3		96 56	28.7		82 15	27.2	
10.5	117 22	33.2		96 07	32.0		114 35	32.6		95 50	29.8		91 14	28.3		76 49	27.2	
11.0	110 44	-33.1		89 46	-31.6		108 08	-32.0		89 55	-29.3		85 36	-28.0		71 23	-27.1	
11.5	104 09	32.9		83 30	31.2		101 46	31.5		84 06	28.9		80 02	27.7		65 58	27.1	
12.0	97 35	32.6		77 18	30.8		95 32	31.0		78 21	28.5		74 31	27.5		60 31	27.2	
12.5	91 05	32.4		71 11	30.4		89 23	30.5		72 41	28.2		69 02	27.3		55 04	27.3	
13.0	84 38	-32.2		65 08	-30.0		83 20	-30.0		67 04	-27.9		63 35	-27.2		49 36	-27.4	
13.5	78 13	31.9		59 10	29.7		77 23	29.6		61 30	27.7		58 09	27.1		44 06	27.6	
14.0	71 52	31.7		53 15	29.4		71 30	29.2		55 59	27.5		52 44	27.1		38 33	27.8	
14.5	65 33	31.4		47 25	29.1		65 42	28.8		50 31	27.3		47 18	27.1		32 58	28.0	
15.0	59 18	-31.1		41 37	-28.8		59 58	-28.5		45 03	-27.2		41 53	-27.1		27 21	-28.2	
15.5	53 06	30.9		35 54	28.5		54 17	28.2		39 37	27.1		36 27	27.2		21 43	-28.2	
16.0	46 57	30.6		30 13	28.2		48 40	28.0		34 12	27.1		31 00	27.3		16 04	...	
16.5	40 51	30.3		24 37	27.8		43 06	27.8		28 46	27.1		25 31	27.4				
17.0	34 50	-30.0		19 07	-27.2		37 33	-27.6		23 21	-27.1		20 02	-27.5		NEW MOON		
17.5	28 52	29.6		13 44	...		32 03	27.4		17 55	-27.1		14 31	...				
18.0	23 00	-29.0					26 36	27.2		12 29	...							
18.5	17 15	...		NEW MOON			21 10	-27.0		NEW MOON			NEW MOON			14 58	...	
19.0				NEW MOON			15 47	...		NEW MOON			NEW MOON			20 57	+30.2	
19.5	NEW MOON									NEW MOON						27 04	30.8	
20.0				15 16	...		NEW MOON						14 16	...		33 16	31.2	
20.5				20 31	+26.4		NEW MOON			14 58	...		20 02	+29.0		39 32	31.5	
21.0	13 19	...		25 49	+26.6					20 32	+27.9		25 52	+29.4		45 52	+31.7	
21.5	18 39	+26.9		31 10	26.7		11 54	...		26 09	28.1		31 46	29.7		52 14	32.0	
22.0	24 04	27.1		36 31	26.8		17 14	+26.7		31 47	28.3		37 44	29.9		58 39	32.2	
22.5	29 31	27.2		41 52	26.8		22 36	27.0		37 28	28.5		43 45	30.2		65 06	32.4	
23.0	34 56	+27.1		47 14	+26.9		28 01	+27.1		43 12	+28.8		49 49	+30.5		71 36	+32.5	
23.5	40 21	27.0		52 38	27.0		33 27	27.3		48 58	29.0		55 57	30.8		78 07	32.7	
24.0	45 45	26.9		58 03	27.1		38 55	27.4		54 48	29.3		62 08	31.1		84 40	32.8	
24.5	51 07	26.9		63 30	27.3		44 25	27.6		60 42	29.6		68 23	31.4		91 14	32.9	
25.0	56 29	+26.8		68 59	+27.6		49 57	+27.8		66 40	+30.0		74 42	+31.7		97 50	+33.0	
25.5	61 52	26.8		74 31	27.8		55 32	28.0		72 41	30.3		81 04	32.0		104 27	33.1	
26.0	67 14	26.9		80 07	28.1		61 10	28.3		78 48	30.7		87 30	32.3		111 04	33.1	
26.5	72 37	27.0		85 46	28.5		66 51	28.6		84 59	31.2		94 00	32.6		117 42	33.1	
27.0	78 02	+27.1		91 31	+28.9		72 36	+29.0		91 16	+31.6		100 33	+32.9		124 19	+33.1	
27.5	83 28	27.3		97 20	29.4		78 26	29.3		97 38	32.1		107 10	33.2		130 57	33.0	
28.0	88 57	27.6		103 16	29.9		84 21	29.8		104 06	32.5		113 51	33.5		137 33	32.9	
28.5	94 30	27.9		109 17	30.4		90 21	30.2		110 39	33.0		120 35	33.7		144 07	32.7	
29.0	100 06	+28.2		115 25	+31.0		96 27	+30.7		117 18	+33.5		127 21	+33.9		150 38	+32..	
29.5	105 47	28.6					102 39	31.3		124 02	33.9		134 09	34.1		157 05	31.9	
30.0	111 33	29.0					108 58	31.8		130 51	34.3		140 58	34.1		163 24	+31..	
30.5	117 25	29.5					115 23	32.4		137 45	34.6		147 48	34.1		169 25	..	
31.0	123 22	+30.0					121 56	+33.0		144 42	+34.9		154 36	+33.9		174 22	..	
31.5	129 25	30.5					128 35	33.5					161 22	+34..				
32.0	135 35	+31.1					135 21	+34.1					168 00	...				

UNIVERSAL TIME

Date	July			August			September			October			November			December		
	Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour		Distance	Var. per Hour	
d	°	'	''	°	'	''	°	'	''	°	'	''	°	'	''	°	'	''
1.0	174	22	...	164	00	-27.1	149	23	-27.1	146	27	-27.1	132	04	-28.1	127	24	-29.6
1.5	174	14	...	158	26	27.9	143	57	27.1	141	01	27.2	126	25	28.4	121	27	29.9
2.0	169	21	...	152	50	28.0	138	33	27.1	135	35	27.3	120	43	28.6	115	27	30.2
2.5	163	36	-29.1	147	16	27.8	133	08	27.0	130	07	27.4	114	57	29.0	109	23	30.5
3.0	157	41	-29.5	141	43	-27.7	127	43	-27.1	124	38	-27.5	109	07	-29.3	103	14	-30.9
3.5	151	47	29.4	136	11	27.5	122	19	27.1	119	06	27.7	103	14	29.7	97	02	31.3
4.0	145	55	29.2	130	42	27.4	116	53	27.2	113	32	28.0	97	15	30.1	90	44	31.6
4.5	140	06	28.9	125	14	27.3	111	26	27.3	107	55	28.3	91	11	30.6	84	22	32.0
5.0	134	22	-28.6	119	48	-27.2	105	58	-27.5	102	14	-28.6	85	01	-31.0	77	55	-32.4
5.5	128	41	28.3	114	23	27.1	100	26	27.7	96	29	29.0	78	46	31.6	71	23	32.8
6.0	123	03	28.0	108	58	27.1	94	52	28.0	90	39	29.4	72	24	32.1	64	47	33.2
6.5	117	29	27.7	103	33	27.1	89	15	28.3	84	44	29.9	65	55	32.6	58	06	33.6
7.0	111	58	-27.5	98	07	-27.2	83	33	-28.7	78	42	-30.4	59	21	-33.1	51	21	-33.9
7.5	106	28	27.4	92	39	27.4	77	46	29.1	72	35	30.9	52	40	33.7	44	34	34.1
8.0	101	01	27.2	87	10	27.6	71	54	29.6	66	21	31.5	45	53	34.1	37	43	34.2
8.5	95	35	27.2	81	39	27.8	65	56	30.1	59	59	32.1	39	01	34.5	30	51	34.3
9.0	90	09	-27.1	76	04	-28.1	59	52	-30.6	53	31	-32.7	32	04	-34.9	24	01	-34.1
9.5	84	44	27.2	70	25	28.4	53	41	31.2	46	55	33.2	25	04	-35.1	17	13	...
10.0	79	17	27.2	64	42	28.8	47	24	31.7	40	13	33.8	18	02	...			
10.5	73	50	27.4	58	55	29.2	40	59	32.3	33	24	34.3						
11.0	68	21	-27.5	53	02	-29.6	34	28	-32.8	26	29	-34.8	NEW MOON			NEW MOON		
11.5	62	49	27.8	47	04	30.0	27	52	33.3	19	29	...						
12.0	57	14	28.0	41	01	30.5	21	10	-33.6							17	59	...
12.5	51	37	28.3	34	52	30.9	14	25	...	NEW MOON			17	37	...	24	28	+32.2
13.0	45	55	-28.6	28	39	-31.3							24	30	+34.2	30	53	+31.9
13.5	40	10	28.9	22	21	-31.5	NEW MOON						31	18	33.8	37	14	31.5
14.0	34	21	29.2	16	03	...				16	07	...	38	01	33.3	43	29	31.0
14.5	28	29	29.5							23	12	+35.3	44	37	32.7	49	39	30.5
15.0	22	34	-29.5	NEW MOON			21	03	...	30	13	+34.9	51	06	+32.1	55	41	+30.0
15.5	16	40	...				28	02	+34.9	37	10	34.5	57	28	31.5	61	38	29.5
16.0							35	01	34.8	44	02	34.0	63	43	30.9	67	29	29.0
16.5	NEW MOON			18	42	...	41	57	34.5	50	47	33.5	69	50	30.4	73	14	28.6
17.0				25	24	+33.7	48	49	+34.2	57	25	+32.9	75	52	+29.9	78	55	+28.2
17.5				32	10	33.9	55	37	33.8	63	57	32.3	81	47	29.4	84	31	27.8
18.0	16	35	...	38	58	34.0	62	20	33.4	70	22	31.8	87	36	28.9	90	03	27.6
18.5	22	53	+31.9	45	47	34.0	68	58	32.9	76	40	31.2	93	21	28.5	95	33	27.3
19.0	29	20	+32.3	52	34	+33.8	75	29	+32.4	82	51	+30.7	99	00	+28.1	100	59	+27.1
19.5	35	51	32.7	59	19	33.6	81	56	32.0	88	56	30.2	104	36	27.8	106	24	27.0
20.0	42	26	32.9	66	01	33.4	88	17	31.5	94	56	29.7	110	08	27.6	111	48	26.9
20.5	49	02	33.1	72	41	33.1	94	32	31.1	100	50	29.3	115	38	27.4	117	10	26.9
21.0	55	39	+33.1	79	17	+32.8	100	42	+30.6	106	39	+28.9	121	05	+27.2	122	33	+26.9
21.5	62	17	33.1	85	49	32.5	106	47	30.2	112	24	28.6	126	30	27.1	127	56	26.9
22.0	68	55	33.1	92	17	32.2	112	48	29.9	118	05	28.3	131	55	27.0	133	19	27.0
22.5	75	32	33.1	98	42	31.9	118	44	29.5	123	42	28.0	137	18	26.9	138	44	27.1
23.0	82	08	+33.0	105	03	+31.6	124	36	+29.2	129	17	+27.8	142	41	+26.9	144	09	+27.2
23.5	88	44	32.9	111	19	31.2	130	25	28.9	134	49	27.6	148	04	26.9	149	36	27.3
24.0	95	17	32.7	117	33	30.9	136	10	28.7	140	20	27.5	153	27	26.9	155	05	27.3
24.5	101	49	32.6	123	42	30.6	141	53	28.4	145	48	27.3	158	49	26.8	160	32	27.2
25.0	108	20	+32.4	129	48	+30.3	147	32	+28.2	151	16	+27.2	164	10	+27.1	165	56	+26.1
25.5	114	48	32.3	135	50	30.0	153	10	28.0	156	42	27.2	169	27	...	171	04	...
26.0	121	14	32.1	141	49	29.7	158	44	27.8	162	08	27.1	174	21	...	174	51	...
26.5	127	38	31.8	147	44	29.4	164	17	+28.1	167	33	+27.1	176	23	...	173	42	...
27.0	133	58	+31.6	153	35	+29.0	169	46	...	172	56	...	172	33	...	168	59	...
27.5	140	16	31.3	159	21	28.6	175	07	...	178	08	...	167	20	-27.1	163	28	-28.1
28.0	146	30	31.0	165	01	+28.1	178	08	...	175	59	...	161	51	27.7	157	41	29.2
28.5	152	39	30.5	170	28	...	173	27	...	170	38	...	156	15	28.1	151	47	29.7
29.0	158	43	+29.9	175	09	...	168	05	-27.1	165	12	-27.1	150	36	-28.4	145	48	-30.1
29.5	164	37	+29.1	175	22	...	162	41	27.0	159	45	27.3	144	53	28.7	139	45	30.4
30.0	170	11	...	170	55	...	157	17	27.1	154	16	27.5	139	07	29.0	133	38	30.7
30.5	174	30	...	165	39	-27.1	151	52	27.1	148	46	27.6	133	17	29.3	127	27	31.0
31.0	173	58	...	160	15	-27.1	146	27	-27.1	143	14	-27.7	127	24	-29.6	121	13	-31.3
31.5	169	25	...	154	49	27.2				137	40	27.9				114	57	31.5
32.0	164	00	-27.1	149	23	-27.1				132	04	-28.1				108	37	-31.7

PLANETARY CONFIGURATIONS

[illegible]

PLANETARY CONFIGURATIONS

[illegible]

Place	Description	Altitude	Longitude
		m	h m s
Aarhus, Denmark	Ole Römer Observatory	50	-0 40 47.3 b
Abastuman, Georgian S. S. R. .	Astrophysical Observatory	1700	-2 51 18.08 b
Abbadia, France	Obs. of Paris Academy of Sciences, Hendaye	69	+0 07 00.1 c
Abinger, Surrey	Branch of Royal Greenwich Observatory	235	+0 01 32.77 c
Albany, New York	Dudley Observatory	70	+4 55 07.12 c
Algiers, Algeria	Algiers Observatory, at Bouzaréah	345	-0 12 08.53 c
Allegheny, Pennsylvania	Observatory of University of Pittsburgh	370	+5 20 05.34 a
Alma-Ata, Kazak S. S. R. . . .	Observatory of Academy of Sciences	1450	-5 07 49.84
Amherst, Mass.	Amherst College Observatory, since 1903	110	+4 50 05.93 a
Amsterdam, Netherlands	Tilanus Observatory	30	-0 19 38.81
Ann Arbor, Michigan	Observatory of University of Michigan	282	+5 34 55.27 c
Appleton, Wisconsin	Underwood Observatory, Lawrence College	242	+5 53 35.92 a
Arcetri (Florence), Italy	Astrophysical Observatory	184	-0 45 01.30 a
Armagh, Northern Ireland	Armagh Observatory	64	+0 26 35.48 b
Ashkhabad, Turkmen S. S. R. . .	Astronomical Observatory	234	-3 53 24.6 b
Asiago (Vicenza), Italy	Astrophysical Observatory of Padua Univ.	1045	-0 46 06.86 b
Athens, Greece	National Observatory	110	-1 34 52.06 c
Baguio City, Philippines	Manila Observatory	1507	-8 02 19.1
Bamberg, Germany	Remeis Observatory	288	-0 43 33.57 c
Barcelona, Spain	Fabra Observatory	415	-0 08 30.2
Basel-Binningen, Switzerland . .	Astron.-Meteorol. Inst., University Basel	318	-0 30 20.02
Baton Rouge, Louisiana	Observatory of University of Louisiana	31	+6 04 42.96
Belgrade, Yugoslavia	Observatory of Academy of Sciences	253	-1 22 03.20
Beloit, Wisconsin	Smith Observatory, Beloit College	—	+5 56 07.4
Berkeley, California	Leuschner Observatory, University of Calif.	94	+8 09 02.91
Berlin, Germany	Wilhelm Foerster Institute	40	-0 53 42
Berlin-Treptow Germany	Archenhold Observatory	38	-0 53 54.2
Berlin-Babelsberg, Germany . . .	Observatory of Academy of Sciences	82	-0 52 25.49 a
Berne, Switzerland	Astronomical Institute of the University	563	-0 29 42.88
Besançon, France	National Observatory	312	-0 23 57.42 c
Beverwijk, Netherlands	Observatory of B. J. Vastenholt	3	-0 18 35.30 b
Billingshurst, Sussex	Observatory of W. B. Caunter	61	+0 02 19.0 a
Blaca, Yugoslavia	Observatory of N. Miličević	223	-1 06 08.0
Blaricum, Netherlands	Observatory of L. J. de Lange	4	-0 20 59.5 b
Bloemfontein, South Africa . . .	Boyden Station, at Mazelspoort	1387	-1 45 37.4 b
Bloomington, Indiana	Kirkwood Observatory, University of Indiana	238	+5 46 05 c
Bogotá, Colombia	National Observatory	2640	+4 56 19.51
Bombay (Colaba), India	Government Observatory	14	-4 51 15.72 c
Bonn, Germany	University Observatory	62	-0 28 23.18
Bordeaux, France	Observatory of Univ. of Bordeaux, at Floirac	73	+0 02 06.60 c
Bosque Alegre, Argentina	Branch of National Observatory	1250	+4 18 11.2 b
Boston, Massachusetts	Boston University Observatory, since 1947	32	+4 44 25.5 a
Brno, Czechoslovakia	Astronomical Inst. of the Polytechnic School	277	-1 06 22.3
Brno, Czechoslovakia	Masaryk University Observatory	277	-1 06 23.9

a Equatorial refractor b Equatorial reflector c Transit or meridian circle d Zenith telescope

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δxy	ΔZ
h m	s	° '	° ' "					
0 40.8	- 6.70	- 10 11.8	+56 07 40	+0.82663	0.55864	+1.47970	-238	-353
2 51.3	-28.14	- 42 49.5	+41 45 18.2	+0.66264	0.74731	+0.88669	-319	-283
23 53.0	+ 1.15	+ 1 45.0	+43 22 52.2	+0.68332	0.72796	+0.93868	-311	-292
23 58.5	+ 0.25	+ 0 23.2	+51 11. 1	+0.77555	0.62811	+1.23473	-268	-331
19 04.9	+48.48	+ 73 46.8	+42 39 12.8	+0.67406	0.73661	+0.91508	-314	-288
0 12.1	- 1.99	- 3 02.1	+36 48 04.8	+0.59577	0.80173	+0.74310	-342	-254
18 39.9	+52.58	+ 80 01.3	+40 28 58.1	+0.64581	0.76173	+0.84782	-325	-276
5 07.8	-50.57	- 76 57.5	+43 11 16.6	+0.68102	0.73043	+0.93236	-312	-291
19 09.9	+47.66	+ 72 31.5	+42 21 56.5	+0.67037	0.74000	+0.90590	-316	-286
0 19.6	- 3.23	- 4 54.7	+52 22 18.3	+0.78833	0.61183	+1.28849	-261	-336
18 25.1	+55.02	+ 83 43.8	+42 16 48.7	+0.66928	0.74102	+0.90319	-316	-286
18 06.4	+58.09	+ 88 24.0	+44 15 39.2	+0.69440	0.71737	+0.96798	-306	-296
0 45.0	- 7.40	- 11 15.3	+43 45 14.4	+0.68804	0.72350	+0.95099	-309	-294
23 33.4	+ 4.37	+ 6 38.9	+54 21 11.1	+0.80897	0.58409	+1.38500	-249	-345
3 53.4	-38.34	- 58 21.2	+37 57 24	+0.61173	0.78951	+0.77482	-337	-261
0 46.1	- 7.58	- 11 31.7	+45 51 44.7	+0.71420	0.69771	+1.02364	-298	-305
1 34.9	-15.58	- 23 43.0	+37 58 19.7	+0.61193	0.78933	+0.77526	-337	-261
8 02.3	-79.23	-120 34.8	+16 24 39	+0.28077	0.95974	+0.29254	-409	-120
0 43.6	- 7.16	- 10 53.4	+49 53 06.4	+0.76114	0.64562	+1.17893	-275	-325
0 08.5	- 1.40	- 2 07.6	+41 24 59.3	+0.65809	0.75108	+0.87620	-320	-281
0 30.3	- 4.98	- 7 35.0	+47 32 27.2	+0.73418	0.67634	+1.08552	-289	-313
17 55.3	+59.91	+ 91 10.7	+30 24 44.1	+0.50325	0.86315	+0.58304	-368	-215
1 22.1	-13.48	- 20 30.8	+44 48 13.2	+0.70114	0.71074	+0.98649	-303	-299
18 03.9	+58.50	+ 89 01.9	+42 30 08.4	+0.67211	0.73838	+0.91025	-315	-287
15 51.0	+80.34	+122 15.7	+37 52 23.5	+0.61057	0.79039	+0.77250	-337	-260
0 53.7	- 8.82	- 13 25.5	+52 28 30	+0.78943	0.61040	+1.29330	-260	-337
0 53.9	- 8.86	- 13 28.6	+52 29 07	+0.78954	0.61026	+1.29378	-260	-337
0 52.4	- 8.61	- 13 06.4	+52 24 24.2	+0.78871	0.61135	+1.29011	-261	-336
0 29.7	- 4.88	- 7 25.7	+46 57 12.7	+0.72726	0.68388	+1.06343	-292	-310
0 24.0	- 3.94	- 5 59.4	+47 14 59.8	+0.73075	0.68007	+1.07452	-290	-312
0 18.6	- 3.05	- 4 38.8	+52 29 09.0	+0.78954	0.61025	+1.29380	-260	-337
23 57.7	+ 0.38	+ 0 34.7	+51 04 51.7	+0.77439	0.62951	+1.23015	-269	-330
1 06.1	-10.86	- 16 32.0	+43 17 32.3	+0.68221	0.72904	+0.93577	-311	-291
0 21.0	- 3.45	- 5 14.9	+52 16 14.8	+0.78725	0.61322	+1.28380	-262	-336
1 45.6	-17.35	- 26 24.3	-29 02 18	-0.48262	0.87518	-0.55145	-373	+206
18 13.9	+56.85	+ 86 31.3	+39 09 56	+0.62818	0.77640	+0.80910	-331	-268
19 03.7	+48.68	+ 74 04.9	+ 4 35 55.2	+0.07967	0.99722	+0.07989	-425	- 34
4 51.3	-47.85	- 72 48.9	+18 53 36.2	+0.32174	0.94646	+0.33995	-404	-137
0 28.4	- 4.66	- 7 05.8	+50 43 45.0	+0.77052	0.63427	+1.21481	-271	-329
23 57.9	+ 0.35	+ 0 31.6	+44 50 07	+0.70151	0.71033	+0.98758	-303	-299
19 41.8	+42.41	+ 64 32.8	-31 35 53	-0.52102	0.85270	-0.61102	-364	+222
19 15.6	+46.72	+ 71 06.4	+42 21 00.6	+0.67016	0.74018	+0.90540	-316	-286
1 06.4	-10.90	- 16 35.6	+49 12 24	+0.75347	0.65462	+1.15099	-279	-321
1 06.4	-10.91	- 16 36.0	+49 12 15.1	+0.75344	0.65465	+1.15089	-279	-321

If the horizontal parallax, $\pi=8''.80/\text{distance}$, is known the parallax corrections are:

$$\Delta\alpha = \frac{\pi}{\sin \delta} \pi \times \rho \cos \phi' \sin h \sec \delta \quad \Delta\delta = \pi \times \rho \cos \phi' (\tan \phi' \cos \delta - \cos h \sin \delta)$$

where $h = \theta - \alpha$ and θ = sidereal time at 0^h + sidereal equivalent of U.T. - λ

Otherwise add $\Delta X = \Delta xy \cos \theta$, $\Delta Y = \Delta xy \sin \theta$, ΔZ to solar co-ordinates to eliminate parallax.

Place	Description	Altitude	Longitude
		m	h m s
Brooklyn, Indiana	Goethe Link Observatory, University of Ind.	300	+ 5 45 34.86 b
Bucharest, Romania	National Observatory	83	- 1 44 23.18
Budapest, Hungary	Konkoly Observatory	474	- 1 15 51.41 c
Buenos Aires, Argentina	Naval Observatory	6	+ 3 53 25.22 c
Bussum, Netherlands	Observatory of D. Schmidt	10	- 0 20 41.6
Cambridge, England	University Observatories	28	- 0 00 22.75 c
Cambridge, England	Observatory of W. H. Steavenson	27	- 0 00 22.77 b
Cambridge, Massachusetts	Harvard College Observatory	24	+ 4 44 31.05
Canberra, Australia	Commonwealth Obs., on Mount Stromlo	768	- 9 56 01.35 c
Cape of Good Hope, S. Africa	Royal Observatory	10	- 1 13 54.38 c
Cape of Good Hope, S. Africa	Obs. of Astronomical Society of South Africa	102	- 1 13 36.8 a
Caracas, Venezuela	Cajigal Observatory	1042	+ 4 27 42.61
Carloforte, Sardinia	International Latitude Observatory	18	- 0 33 14.9 d
Carnoustie, Scotland	Observatory of W. B. Ogilvie	8	+ 0 10 48.26 a
Castel Gandolfo, Italy	Vatican Observatory	450	- 0 50 36.33
Catania, Sicily	Astrophysical Observatory	47	- 1 00 20.60
Charlottesville, Virginia	Leander McCormick Obs., University of Va.	259	+ 5 14 05.33 a
Cincinnati, Ohio	Cincinnati Observatory	247	+ 5 37 41.40 a
Claremont, California	F. P. Brackett Observatory, Pomona College	368	+ 7 50 50.68 c
Cleethorpes, Lincolnshire	Observatory of W. T. Gayfer	—	+ 0 00 11.0 b
Cleveland, Ohio	Warner and Swasey Observatory	247	+ 5 26 16.36 c
Coimbra, Portugal	University Observatory	99	+ 0 33 43.10 c
Columbia, South Carolina	Melton Memorial Obs., University of S. C.	98	+ 5 24 06.20 a
Columbus, Ohio	McMillin Observatory, State University	233	+ 5 32 02.60 c
Copenhagen, Denmark	University Observatory	14	- 0 50 18.69 a
Copenhagen, Denmark	Urania Observatory	10	- 0 50 09.11 a
Copenhagen, Denmark	Observatory of P. Darnell	—	- 0 49 48.67
Copenhagen, Denmark	Observatory of V. Hegvad	—	- 0 50 01.4
Copenhagen, Denmark	Observatory of S. Kierulff	—	- 0 50 06.4
Copenhagen, Denmark	Observatory of N. P. Wieth-Knudsen	21	- 0 50 13.0
Cordoba, Argentina	National Observatory	434	+ 4 16 47.16
Cracow, Poland	University Observatory	221	- 1 19 50.3 a
Danzig, Danzig	Municipal Observatory	31	- 1 14 36.5
Decatur, Georgia	Bradley Observatory, Agnes Scott College	315	+ 5 37 10.60 b
Dehra Dun, India	Haig Obs., Trigonometrical Survey of India	682	- 5 12 11.79
Delaware, Ohio	Perkins Obs., Ohio Wesleyan University	270	+ 5 32 13.33
Denver, Colorado	Chamberlin Observatory, Univ. of Denver	1644	+ 6 59 47.72 a
Des Moines, Iowa	Drake University Municipal Observatory	291	+ 6 14 44.7 c
Driehuis-Velsen, Netherlands	Observatory of A. Mak	—	- 0 18 34.15 a
Dublin, Ireland	Dunsink Observatory	86	+ 0 25 21.1 c
Dunedin, New Zealand	Observatory of Otago Institute	141	-11 21 58.05 b
Dunedin, New Zealand	Observatory of G. Couling	200	-11 21 59.3 a
Edinburgh, Scotland	Royal Observatory	146	+ 0 12 44.10 c
Evanston, Illinois	Dearborn Obs., Northwestern University	175	+ 5 50 41.84 c

a Equatorial refractor

b Equatorial reflector

c Transit or meridian circle

d Zenith telescope

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δxy	ΔZ
h m	s	° ' "	° ' "					
18 14.4	+56.77	+ 86 23.7	+39 32 57.7	+0.63336	0.77217	+0.82023	-329	-270
1 44.4	-17.15	- 26 05.8	+44 24 50	+0.69629	0.71549	+0.97316	-305	-297
1 15.9	-12.46	- 18 57.9	+47 29 58.6	+0.73371	0.67688	+1.08396	-289	-313
20 06.6	+38.34	+ 58 21.3	-34 37 18.3	-0.56495	0.82382	-0.68577	-351	+241
0 20.7	- 3.40	- 5 10.4	+52 16 34.2	+0.78731	0.61315	+1.28405	-262	-336
0 00.4	- 0.06	- 0 05.7	+52 12 51.6	+0.78665	0.61400	+1.28119	-262	-336
0 00.4	- 0.06	- 0 05.7	+52 12 53.3	+0.78666	0.61400	+1.28121	-262	-336
19 15.5	+46.74	+ 71 07.8	+42 22 47.6	+0.67054	0.73983	+0.90635	-316	-286
9 56.0	-97.91	-149 00.3	-35 19 16	-0.57499	0.81694	-0.70383	-349	+245
1 13.9	-12.14	- 18 28.6	-33 56 02.5	-0.55507	0.83055	-0.66831	-354	+237
1 13.6	-12.09	- 18 24.2	-33 56 05.1	-0.55509	0.83055	-0.66833	-354	+237
19 32.3	+43.98	+ 66 55.7	+10 30 24.3	+0.18118	0.98350	+0.18421	-420	- 77
0 33.2	- 5.46	- 8 18.7	+39 08 08.9	+0.62776	0.77670	+0.80825	-331	-268
23 49.2	+ 1.78	+ 2 42.1	+56 30 03.3	+0.83023	0.55322	+1.50073	-236	-354
0 50.6	- 8.31	- 12 39.1	+41 44 47.4	+0.66239	0.74726	+0.88642	-319	-283
1 00.3	- 9.91	- 15 05.1	+37 30 13.3	+0.60548	0.79431	+0.76227	-339	-258
18 45.9	+51.60	+ 78 31.3	+38 02 01.2	+0.61279	0.78869	+0.77697	-336	-261
18 22.3	+55.47	+ 84 25.3	+39 08 19.8	+0.62782	0.77669	+0.80833	-331	-268
16 09.2	+77.35	+117 42.7	+34 05 34.0	+0.55739	0.82905	+0.67232	-354	-238
23 59.8	+ 0.03	+ 0 02.7	+53 33 21.6	+0.80077	0.59533	+1.34508	-254	-342
18 33.7	+53.60	+ 81 34.1	+41 32 13.1	+0.65965	0.74967	+0.87992	-320	-281
23 26.3	+ 5.54	+ 8 25.8	+40 12 24.5	+0.64212	0.76480	+0.83959	-326	-274
18 35.9	+53.24	+ 81 01.6	+33 59 46.7	+0.55597	0.82996	+0.66988	-354	-237
18 28.0	+54.55	+ 83 00.7	+39 59 50.4	+0.63934	0.76717	+0.83338	-327	-273
0 50.3	- 8.26	- 12 34.7	+55 41 12.6	+0.82231	0.56501	+1.45537	-241	-351
0 50.2	- 8.24	- 12 32.3	+55 41 19.2	+0.82232	0.56499	+1.45547	-241	-351
0 49.8	- 8.18	- 12 27.2	+55 42 13	+0.82247	0.56477	+1.45629	-241	-351
0 50.0	- 8.22	- 12 30.3	+55 40 10	+0.82213	0.56526	+1.45442	-241	-351
0 50.1	- 8.23	- 12 31.6	+55 41 38	+0.82237	0.56491	+1.45576	-241	-351
0 50.2	- 8.25	- 12 33.2	+55 40 46	+0.82223	0.56512	+1.45497	-241	-351
19 43.2	+42.18	+ 64 11.8	-31 25 16.4	-0.51833	0.85420	-0.60680	-364	+221
1 19.8	-13.12	- 19 57.6	+50 03 52.0	+0.76315	0.64322	+1.18645	-274	-326
1 14.6	-12.26	- 18 39.1	+54 21 37.9	+0.80904	0.58398	+1.38538	-249	-345
18 22.8	+55.39	+ 84 17.7	+33 55 54.5	+0.55506	0.83061	+0.66825	-354	-237
5 12.2	-51.29	- 78 02.9	+30 18 51.8	+0.50184	0.86410	+0.58076	-369	-214
18 27.8	+54.58	+ 83 03.3	+40 15 04	+0.64273	0.76433	+0.84090	-326	-274
17 00.2	+68.96	+104 56.9	+39 40 36.4	+0.63520	0.77091	+0.82396	-329	-271
17 45.3	+61.56	+ 93 41.2	+41 35 40	+0.66040	0.74901	+0.88170	-320	-282
0 18.6	- 3.05	- 4 38.5	+52 26 56.8	+0.78915	0.61076	+1.29209	-261	-337
23 34.6	+ 4.16	+ 6 20.3	+53 23 13.1	+0.79903	0.59771	+1.33681	-255	-341
11 22.0	-112.03	-170 29.5	-45 52 25.9	-0.71424	0.69746	-1.02405	-298	+305
11 22.0	-112.03	-170 29.8	-45 52 34	-0.71427	0.69744	-1.02413	-298	+305
23 47.3	+ 2.09	+ 3 11.0	+55 55 30	+0.82466	0.56159	+1.46844	-240	-352
18 09.3	+ 57.61	+ 87 40.5	+42 03 27.2	+0.66640	0.74361	+0.89616	-317	-284

If the horizontal parallax, $\pi=8''.80/\text{distance}$, is known the parallax corrections are:

$$\Delta\alpha = \frac{1}{\sin \delta} \pi \times \rho \cos \phi' \sin h \sec \delta \quad \Delta\delta = \pi \times \rho \cos \phi' (\tan \phi' \cos \delta - \cos h \sin \delta)$$

where $h = \theta - \alpha$ and θ = sidereal time at ob + sidereal equivalent of U.T. - λ

Otherwise add $\Delta X = \Delta\alpha_y \cos \theta$, $\Delta Y = \Delta\alpha_y \sin \theta$, ΔZ to solar co-ordinates to eliminate parallax.

Place	Description	Altitude	Longitude
		m	h m s
Eva Perón, Argentina	National University Observatory	17	+3 51 43.72 c
Faenza, Italy	Urania Lamonia Observatory	51	-0 47 30.9
Fayette, Missouri	Morrison Observatory, since 1936	232	+6 10 48.00
Flagstaff, Arizona	Lowell Observatory	2210	+7 26 44.6 a
Fort Davis, Texas	McDonald Observatory, University of Texas	2081	+6 56 05.36
Fredericton, New Brunswick	Observatory of the University of New Brunswick	40	+4 26 34
Gaithersburg, Maryland	International Latitude Observatory	155	+5 08 47.8 d
Geneva, New York	Smith Observatory	152	+5 08 01.00
Geneva, Switzerland	Municipal Observatory	407	-0 24 36.61 c
Genoa, Italy	Hydrographic Institute	105	-0 35 41.28 c
Gorki, R. S. F. S. R.	Latitude Station	163	-2 55 56
Göttingen, Germany	University Observatory	161	-0 39 46.22
Greencastle, Indiana	McKim Observatory, De Pauw University	262	+5 47 24.36 c
Greenwich, England	Royal Observatory	47	0 00 00.00 c
Groningen, Netherlands	Kapteyn Astronomical Laboratory	4	-0 26 15.11
Groningen, Netherlands	Observatory of M. Schmidt	—	-0 26 13.44
Haarlem, Netherlands	Observatory of B. J. M. Walker	0	-0 18 35.47
Hamburg, Germany	Hamburg Observatory, at Bergedorf	41	-0 40 57.74 c
Hanover, Germany	Geodetic Institute	50	-0 38 51.3
Hanover, Germany	Observatory of Hanover Astronomical Society	50	-0 39 00.8
Hanover, New Hampshire	Shattuck Observatory, Dartmouth College	183	+4 49 08.02
Hardenberg, Netherlands	Observatory of D. G. H. Kenskamp	15	-0 26 27.9 a
Harderwijk, Netherlands	Observatory of J. van Raalten	2	-0 22 28.52 b
Hartebeespoort, South Africa	Union Observatory Annexe	1220	-1 51 30.44 a
Harvard, Massachusetts	George R. Agassiz Station of Harvard Obs.	183	+4 46 14.2
Haverford, Pennsylvania	Strawbridge Memorial Obs., Haverford Coll.	116	+5 01 12.70 d
Heidelberg, Germany	Baden Observatory, at Königstuhl	570	-0 34 53.19 c
Helsingör, Denmark	Observatory of R. Fr. Rasmussen	—	-0 50 25.6
Helsinki, Finland	University Observatory	33	-1 39 49.10 c
Helsinki, Finland	Ursa Observatory	25	-1 39 50.09
Helsinki, Finland	Observatory of Institute of Technology	38	-1 39 44.30
Helwan, Egypt	Helwan Observatory	115	-2 05 21.87
Herstmonceux, Sussex	Royal Greenwich Observatory	32	-0 01 21.1 a
Hoorn, Netherlands	Observatory of J. C. van der Meulen	—	-0 20 12.90 b
Huittinen, Finland	Observatory of Mr. Jaakola	58	-1 30 39.00
Hyderabad, India	Nizamiah Observatory	554	-5 13 48.98
Iowa City, Iowa	Observatory University of Iowa	221	+6 06 08
Ipswich, Suffolk	Observatory of Ipswich Astronomical Society	37	-0 04 44.8 a
Irkutsk, R. S. F. S. R.	University Observatory	468	-6 57 22.71 c
Irkutsk, R. S. F. S. R.	City Astronomical Observatory	432	-6 57 07.1
Ithaca, New York	Fuertes Observatory of Cornell University	270	+5 05 54.3 a
Jakarta, Indonesia	International Latitude Observatory	23	-7 07 32 d
Jena, Germany	University Observatory	164	-0 46 20.22 a
Johannesburg, South Africa	Union Observatory	1806	-1 52 18.0
Johannesburg, South Africa	Branch of Yale University Observatory	1741	-1 52 07 a

a Equatorial refractor b Equatorial reflector c Transit or meridian circle d Zenith telescope

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δxy	ΔZ
h m	s	° '	° ' "					
20 08.3	+38.07	+ 57 55.9	-34 54 30.3	-0.56905	0.82097	-0.69314	-350	+243
0 47.5	- 7.81	- 11 52.7	+44 17 14	+0.69471	0.71703	+0.96886	-306	-296
17 49.2	+60.91	+ 92 42.0	+39 09 00.0	+0.62797	0.77657	+0.80865	-331	-268
16 33.3	+73.39	+111 41.1	+35 12 30.5	+0.57352	0.81826	+0.70090	-349	-245
17 03.9	+68.35	+104 01.3	+30 40 17.0	+0.50729	0.86114	+0.58909	-367	-216
19 33.4	+43.79	+ 66 38.5	+45 57.0	+0.71515	0.69650	+1.02677	-297	-305
18 51.2	+50.73	+ 77 11.9	+39 08 13.2	+0.62779	0.77670	+0.80828	-331	-268
18 52.0	+50.60	+ 77 00.3	+42 52 46.2	+0.67696	0.73395	+0.92235	-313	-289
0 24.6	- 4.04	- 6 09.2	+46 11 59.3	+0.71821	0.69340	+1.03577	-296	-306
0 35.7	- 5.86	- 8 55.3	+44 25 09.3	+0.69636	0.71542	+0.97334	-305	-297
2 55.9	-28.90	- 43 59.0	+56 15 32	+0.82791	0.55675	+1.48704	-238	-353
0 39.8	- 6.53	- 9 56.6	+51 31 48.2	+0.77930	0.62341	+1.25007	-266	-332
18 12.6	+57.07	+ 86 51.1	+39 38 46.6	+0.63465	0.77109	+0.82306	-329	-271
0 00.0	0.00	0 00.0	+51 28 38.2	+0.77871	0.62411	+1.24770	-266	-332
0 26.3	- 4.31	- 6 33.8	+53 13 13.8	+0.79728	0.60003	+1.32873	-256	-340
0 26.2	- 4.31	- 6 33.4	+53 12 46.4	+0.79720	0.60014	+1.32836	-256	-340
0 18.6	- 3.05	- 4 38.9	+52 23 59.4	+0.78863	0.61144	+1.28979	-261	-336
0 41.0	- 6.73	- 10 14.4	+53 28 46.9	+0.79999	0.59641	+1.34134	-254	-341
0 38.9	- 6.38	- 9 42.8	+52 23 13	+0.78850	0.61162	+1.28919	-261	-336
0 39.0	- 6.41	- 9 45.2	+52 24 36	+0.78874	0.61130	+1.29026	-261	-337
19 10.9	+47.50	+ 72 17.0	+43 42 15.3	+0.68742	0.72410	+0.94934	-309	-293
0 26.5	- 4.35	- 6 37.0	+52 34 35.6	+0.79051	0.60900	+1.29805	-260	-337
0 22.5	- 3.69	- 5 37.1	+52 20 36.7	+0.78803	0.61222	+1.28717	-261	-336
1 51.5	-18.32	- 27 52.6	-25 46 22.4	-0.43224	0.90127	-0.47959	-385	+184
19 13.8	+47.02	+ 71 33.5	+42 30 13	+0.67215	0.73839	+0.91029	-315	-287
18 58.8	+49.48	+ 75 18.2	+40 00 40.1	+0.63952	0.76700	+0.83379	-327	-273
0 34.9	- 5.73	- 8 43.3	+49 23 54.6	+0.75568	0.65212	+1.15882	-278	-322
0 50.4	- 8.28	- 12 36.4	+56 02 22	+0.82576	0.55992	+1.47478	-239	-352
1 39.8	-16.40	- 24 57.3	+60 09 42.3	+0.86379	0.49882	+1.73168	-213	-369
1 39.8	-16.40	- 24 57.5	+60 09 20	+0.86374	0.49891	+1.73124	-213	-369
1 39.7	-16.38	- 24 56.1	+60 09 48	+0.86381	0.49880	+1.73179	-213	-369
2 05.4	-20.59	- 31 20.5	+29 51 31.1	+0.49494	0.86800	+0.57021	-370	-211
0 01.4	- 0.22	- 0 20.3	+50 52 01.3	+0.77203	0.63241	+1.22079	-270	-329
0 20.2	- 3.32	- 5 03.2	+52 38 38.4	+0.79122	0.60806	+1.30122	-259	-338
1 30.6	-14.89	- 22 39.7	+61 07 40	+0.87207	0.48411	+1.80138	-207	-372
5 13.8	-51.55	- 78 27.2	+17 25 54.3	+0.29767	0.95445	+0.31188	-407	-127
17 53.9	+60.15	+ 91 32.0	+41 39 44	+0.66128	0.74822	+0.88380	-319	-282
0 04.7	- 0.78	- 1 11.2	+52 02 16.3	+0.78476	0.61643	+1.27307	-263	-335
6 57.4	-68.56	-104 20.7	+52 16 44.4	+0.78740	0.61315	+1.28418	-262	-336
6 57.1	-68.52	-104 16.8	+52 16 27	+0.78734	0.61322	+1.28395	-262	-336
18 54.1	+50.25	+ 76 28.6	+42 27 10.4	+0.67150	0.73900	+0.90867	-315	-286
7 07.5	-70.23	-106 53.0	- 6 15 38.5	-0.10832	0.99408	-0.10897	-424	+ 46
0 46.3	- 7.61	- 11 35.1	+50 55 35.6	+0.77271	0.63161	+1.22339	-269	-330
1 52.3	-18.45	- 28 04.5	-26 10 55.3	-0.43867	0.89824	-0.48837	-383	+187
1 52.1	-18.42	- 28 01.7	-26 11 14	-0.43875	0.89819	-0.48848	-383	+187

If the horizontal parallax, $\pi=8''.80$ /distance, is known the parallax corrections are:

$$\Delta\alpha = \frac{\pi}{\sin \delta} \pi \times \rho \cos \phi' \sin h \sec \delta \quad \Delta\delta = \pi \times \rho \cos \phi' (\tan \phi' \cos \delta - \cos h \sin \delta)$$

where $h = \theta - \alpha$ and θ = sidereal time at 0^h + sidereal equivalent of U.T. - λ

Otherwise add $\Delta X = \Delta x_y \cos \theta$, $\Delta Y = \Delta x_y \sin \theta$, ΔZ to solar co-ordinates to eliminate parallax.

Place	Description	Altitude	Longitude
		m	h m s
Juvisy, France	M. Flammarion's Observatory	95	-0 09 29.0
Kalocsa, Hungary	Archiepiscopal Haynald Observatory	117	-1 15 54.12 c
Karlsruhe, Germany	Observatory of W. Malsch	128	-0 33 32.51
Kazan, R. S. F. S. R.	Engelhardt Observatory	98	-3 15 15.74 c
Kazan, R. S. F. S. R.	University Observatory	79	-3 16 29.03
Kharkov, Ukrainian S. S. R. . .	University Observatory	138	-2 24 55.72 c
Kiev, Ukrainian S. S. R. . . .	Astronomical Observatory	184	-2 02 00.56 c
Kitab, Uzbek S. S. R.	International Latitude Observatory	658	-4 27 31.7 d
Kodaikanal, India	Solar Physics Observatory	2343	-5 09 52.47
Königsberg, Germany	University Observatory	24	-1 21 58.97 c
Kremsmünster, Austria	Observatory of the Benedictines	384	-0 56 31.58 c
Ksara, Syria	Ksara Observatory, near Beirut	923	-2 23 33.77
Kunming, China	National Institute of Astronomy	1940	-0 51 09.2
Kyoto, Japan	Kwasan Observatory	234	-9 03 10.40 a
Lake Angelus, Michigan	McMath-Hulbert Observatory ¹	296	+5 33 03.3
Larchmont, New York	Observatory of W. Stevens	15	+4 55 00.6
Leiden, Netherlands	University Observatory	6	-0 17 56.15 c
Leiden, Netherlands	Observatory of J. F. M. Bruijn	—	-0 17 59.26
Leipzig, Germany	University Observatory, since 1861	119	-0 49 33.92
Lembang, Indonesia	Bosscha Observatory	1300	-7 10 27.84
Leningrad, R. S. F. S. R. . . .	University Observatory	3	-2 01 10.71 c
Liège, Belgium	University Observatory, Cointe	127	-0 22 15.44
Lisbon, Portugal	Lisbon Observatory, at Tapada	95	+0 36 44.68 a
Lisbon, Portugal	Observatory of Faculty of Sciences	77	+0 36 35.61
Liverpool, England	Bidston, Birkenhead, since 1867	61	+0 12 17.33
Louisville, Kentucky	Observatory of University of Louisville	152	+5 43 02.4 b
Lund, Sweden	Royal University Observatory	34	-0 52 44.97
Lvov, Ukrainian S. S. R. . . .	Astronomical Institute of the University	330	-1 36 07.13
Lvov, Ukrainian S. S. R. . . .	Observatory of the Polytechnic Institute	340	-1 36 03.40 c
Lyons, France	University Observatory	299	-0 19 08.52 c
Madison, Wisconsin	Washburn Obs., University of Wisconsin	292	+5 57 37.90 c
Madras, India	Observatory founded by East India Co.	7	-5 20 59.14
Madrid, Spain	Astronomical Observatory	655	+0 14 45.1
Mamaroneck, New York	Observatory of E. A. Sill	—	+4 54 56.33 a
Marseilles, France	National Observatory, at Longchamp	75	-0 21 34.55 c
Meudon, France	Observatory of Physical Astronomy	162	-0 08 55.5
Middletown, Connecticut . . .	Van Vleck Observatory, Wesleyan University	65	+4 50 38.2 a
Milan, Italy	Brera Observatory	120	-0 36 45.89 a
Mill Hill, London	Observatory of University of London	82	+0 00 57.77
Minneapolis, Minnesota	Observatory of University of Minnesota	260	+6 12 57.04 c
Mizusawa, Japan	International Latitude Observatory	61	-9 24 31.46 d
Modena, Italy	Royal University Geophysical Observatory	64	-0 43 43.40
Montevideo, Uruguay	National Observatory	24	+3 44 51
Montreal, Quebec	McGill University Observatory	57	+4 54 18.63 c

a Equatorial refractor

b Equatorial reflector

c Transit or meridian circle

d Zenith telescope

¹ Branch of the Observatory of the University of Michigan at Ann Arbor

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δxy	ΔZ
h m	s	° '	° ' "					
0 09.5	- 1.56	- 2 22.3	+48 41 37	+0.74757	0.66135	+1.13037	-282	-319
1 15.9	-12.47	- 18 58.5	+46 31 41.7	+0.72213	0.68923	+1.04773	-294	-308
0 33.5	- 5.51	- 8 23.1	+49 01 26.6	+0.75137	0.65701	+1.14360	-280	-321
3 15.3	-32.08	-48 48.9	+55 50 20.2	+0.82381	0.56283	+1.46370	-240	-351
3 16.5	-32.28	-49 07.3	+55 47 23.9	+0.82333	0.56353	+1.46102	-240	-351
2 24.9	-23.81	- 36 13.9	+50 00 09.9	+0.76245	0.64404	+1.18386	-275	-325
2 02.0	-20.04	- 30 30.1	+50 27 11.8	+0.76748	0.63800	+1.20296	-272	-327
4 27.5	-43.95	- 66 52.9	+39 08 01.7	+0.62780	0.77680	+0.80819	-331	-268
5 09.9	-50.90	- 77 28.1	+10 13 50	+0.17650	0.98457	+0.17927	-420	- 75
1 22.0	-13.47	- 20 29.7	+54 42 50.5	+0.81262	0.57896	+1.40358	-247	-347
0 56.5	- 9.29	- 14 07.9	+48 03 23.1	+0.74023	0.66968	+1.10533	-286	-316
2 23.6	-23.58	- 35 53.4	+33 49 25.6	+0.55356	0.83174	+0.66554	-355	-236
6 51.2	-67.54	-102 47.3	+25 01 32.0	+0.42056	0.90694	+0.46371	-387	-179
9 03.2	-89.23	-135 47.6	+34 59 40.8	+0.57030	0.82014	+0.69536	-350	-243
18 26.9	+54.71	+ 83 15.8	+42 39 47.7	+0.67420	0.73652	+0.91539	-314	-288
19 05.0	+48.46	+ 73 45.1	+40 56 12	+0.65176	0.75653	+0.86152	-323	-278
0 17.9	- 2.95	- 4 29.0	+52 09 19.8	+0.78602	0.61481	+1.27847	-262	-335
0 18.0	- 2.96	- 4 29.8	+52 08 49.1	+0.78593	0.61493	+1.27808	-262	-335
0 49.6	- 8.14	- 12 23.5	+51 20 05.9	+0.77717	0.62606	+1.24136	-267	-332
7 10.5	-70.71	-107 37.0	- 6 49 32.9	-0.11808	0.99316	-0.11889	-424	+ 50
2 01.2	-19.91	- 30 17.7	+59 56 32.2	+0.86188	0.50214	+1.71641	-214	-368
0 22.3	- 3.66	- 5 33.9	+50 37 06	+0.76930	0.63577	+1.21002	-271	-328
23 23.3	+ 6.04	+ 9 11.2	+38 42 30.7	+0.62198	0.78138	+0.79601	-333	-265
23 23.4	+ 6.01	+ 9 08.9	+38 43 03.5	+0.62210	0.78128	+0.79627	-333	-265
23 47.7	+ 2.02	+ 3 04.3	+53 24 04.8	+0.79918	0.59751	+1.33751	-255	-341
18 17.0	+56.35	+ 85 45.6	+38 12 50	+0.61525	0.78674	+0.78202	-336	-262
0 52.7	- 8.67	- 13 11.2	+55 41 51.6	+0.82241	0.56486	+1.45596	-241	-351
1 36.1	-15.79	- 24 01.8	+49 49 57.6	+0.76056	0.64632	+1.17675	-276	-324
1 36.1	-15.78	- 24 00.8	+49 50 11.2	+0.76060	0.64628	+1.17690	-276	-325
0 19.1	- 3.14	- 4 47.1	+45 41 41.0	+0.71208	0.69972	+1.01766	-299	-304
18 02.4	+58.75	+ 89 24.5	+43 04 36.8	+0.67949	0.73162	+0.92874	-312	-290
5 21.0	-52.73	- 80 14.8	+13 04 08.0	+0.22464	0.97427	+0.23057	-416	- 96
23 45.2	+ 2.42	+ 3 41.3	+40 24 30.0	+0.64485	0.76260	+0.84560	-325	-275
19 05.1	+48.45	+ 73 44.1	+40 56 30.1	+0.65183	0.75647	+0.86167	-323	-278
0 21.6	- 3.54	- 5 23.6	+43 18 16.3	+0.68235	0.72888	+0.93616	-311	-291
0 08.9	- 1.47	- 2 13.9	+48 48 18	+0.74886	0.65990	+1.13481	-282	-319
19 09.4	+47.74	+ 72 39.5	+41 33 18	+0.65986	0.74944	+0.88048	-320	-282
0 36.8	- 6.04	- 9 11.5	+45 27 59.2	+0.70927	0.70254	+1.00958	-300	-303
23 59.0	+ 0.16	+ 0 14.4	+51 36 46.3	+0.78019	0.62227	+1.25378	-265	-333
17 47.0	+61.27	+ 93 14.3	+44 58 40.0	+0.70329	0.70860	+0.99251	-302	-300
9 24.5	-92.74	-141 07.9	+39 08 03.4	+0.62774	0.77672	+0.80820	-331	-268
0 43.7	- 7.18	- 10 55.9	+44 38 51.4	+0.69919	0.71263	+0.98113	-304	-298
20 15.2	+36.94	+ 56 12.7	-34 54 33	-0.56906	0.82097	-0.69316	-350	+343
19 05.7	+48.35	+ 73 34.7	+45 30 20	+0.70974	0.70205	+1.01096	-300	-303

If the horizontal parallax, $\pi=8''.80/\text{distance}$, is known the parallax corrections are:

$$\Delta\alpha = \frac{\pi}{\cos \delta} \pi \times \rho \cos \phi' \sin h \sec \delta \quad \Delta\delta = \pi \times \rho \cos \phi' (\tan \phi' \cos \delta - \cos h \sin \delta)$$

where $h = \theta - \alpha$ and θ = sidereal time at 0^h + sidereal equivalent of U.T. - λ

Otherwise add $\Delta X = \Delta_{xy} \cos \theta$, $\Delta Y = \Delta_{xy} \sin \theta$, ΔZ to solar co-ordinates to eliminate parallax.

Place	Description	Altitude	Longitude
		m	h m s
Montreal, Quebec	Ville-Marie Observatory	69	+ 4 54 29.2
Moscow, R. S. F. S. R.	Observatory of Sternberg Inst. of University	166	- 2 30 16.95 c
Mount Hamilton, California . . .	Lick Observatory, University of California	1283	+ 8 06 34.93 c
Mount Palomar, California . . .	Palomar Observatory ¹	1706	+ 7 47 27.36 b
Mount Wilson, California . . .	Observatory of Carnegie Institution	1742	+ 7 52 14.33 b
Mount Wilson, California . . .	Branch of Smithsonian Astrophysical Obs.	1675	+ 7 52 14.3
Munich, Germany	Munich Observatory	529	- 0 46 26.02
Nanking, China	National Institute of Astronomy	367	- 7 55 17.02
Nantucket, Massachusetts . . .	Maria Mitchell Observatory	20	+ 4 40 25.15 a
Naples, Italy	Astronomical Observatory, at Capodimonte	164	- 0 57 01.41 a
Nashville, Tennessee	Arthur J. Dyer Observatory, Vanderbilt Univ.	345	+ 5 47 13.27 b
Neuchâtel, Switzerland	Cantonal Observatory	488	- 0 27 49.79 c
New Haven, Connecticut . . .	Yale University Observatory	40	+ 4 51 40.58
New Plymouth, New Zealand . . .	Obs. of New Plymouth Astronomical Society	49	-11 36 17.77 a
New York, New York	Columbia University Observatory	25	+ 4 55 50
Nice, France	Nice Observatory, at Mont Gros	376	- 0 29 12.10 c
Nikolaev, Ukraina	Astronomical Observatory	54	- 2 07 53.92 c
Norman, Oklahoma	Observatory of University of Oklahoma	363	+ 6 29 46.48
Northampton, Massachusetts . .	Smith College Observatory	70	+ 4 50 33.10 c
Northfield, Minnesota	Goodsell Observatory	290	+ 6 12 35.92 c
Nuth, Netherlands	Observatory of J. Muijtens	—	- 0 23 33.3
Oakland, California	Chabot Observatory	99	+ 8 08 48
Odessa, Ukrainian S. S. R. . . .	Odessa Observatory	53	- 2 03 01.98
Ondřejov, Czechoslovakia . . .	Astrophysical Observatory	533	- 0 59 08.08
Orono, Maine	Observatory of University of Maine	38	+ 4 34 40.3
Oslo, Norway	University Observatory	25	- 0 42 53.5 c
Ottawa, Ontario	Dominion Observatory	87	+ 5 02 51.95 c
Oxford, England	University Observatory	64	+ 0 05 00.4 c
Oxford, Mississippi	Observatory of University of Mississippi	161	+ 5 58 07.18
Padua, Italy	Astronomical Observatory	38	- 0 47 29.15
Palermo, Sicily	University Astronomical Observatory	72	- 0 53 25.87
Palo Alto, California	Observatory of H. Power	10	+ 8 08 35.04
Paris, France	Observatory of Paris ²	67	- 0 09 20.91 c
Perth, Western Australia . . .	Government Observatory	65	- 7 43 21.62 a
Philadelphia, Pennsylvania . . .	Flower Obs., University of Pennsylvania	74	+ 5 01 06.88 a
Philadelphia, Pennsylvania . . .	Franklin Institute Observatory	30	+ 5 00 41.6 a
Pic du Midi, France	Observatory of University of Toulouse	2862	- 0 00 34.16 a
Pola, Italy	Observatory of Hydrographic Office	32	- 0 55 23.07 c
Poltava, Ukrainian S. S. R. . . .	Gravimetric Observatory	151	- 2 18 11.2
Portage Lake, Michigan	Portage Lake Observatory ⁴	321	+ 5 35 41.93 b
Portland, Oregon	Observatory of R. E. Millard	213	+ 8 10 48.2
Potsdam, Germany	Astrophysical Observatory	107	- 0 52 15.86 a
Potsdam, Germany	Geodetic Institute ³	109	- 0 52 16.11
Poughkeepsie, New York	Vassar College Observatory	61	+ 4 55 35.16 c
Poznań, Poland	University Observatory	85	- 1 07 30.78 a

a Equatorial refractor b Equatorial reflector c Transit or meridian circle d Zenith telescope

¹ Of Carnegie Institution of Washington and California Institute of Technology ² Cassini's Meridian ³ Helmert Tower; zero of the German triangulation ⁴ Branch of the Observatory of University of Michigan

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δxy	ΔZ
h m	s	° '	° ' "					
19 05.5	+ 48.38	+ 73 37.3	+45 28 22	+0.70934	0.70246	+1.00981	-300	-303
2 30.3	- 24.69	- 37 34.2	+55 45 19.8	+0.82300	0.56404	+1.45912	-241	-351
15 53.4	+ 79.93	+121 38.7	+37 20 25.3	+0.60334	0.79619	+0.75778	-340	-257
16 12.5	+ 76.79	+116 51.8	+33 21 22.4	+0.54685	0.83635	+0.65386	-357	-233
16 07.8	+ 77.58	+118 03.6	+34 12 59.5	+0.55929	0.82802	+0.67545	-353	-239
16 07.8	+ 77.58	+118 03.6	+34 12 55	+0.55927	0.82803	+0.67542	-353	-239
0 46.4	- 7.63	- 11 36.5	+48 08 45.5	+0.74129	0.66854	+1.10882	-285	-316
7 55.3	- 78.08	-118 49.3	+32 03 59.9	+0.52787	0.84828	+0.62228	-362	-225
19 19.6	+ 46.07	+ 70 06.3	+41 16 50	+0.65627	0.75259	+0.87202	-321	-280
0 57.0	- 9.37	- 14 15.4	+40 51 45.7	+0.65080	0.75739	+0.85927	-323	-278
18 12.8	+ 57.04	+ 86 48.3	+36 03 08.5	+0.58528	0.80947	+0.72305	-345	-250
0 27.8	- 4.57	- 6 57.4	+46 59 50.6	+0.72777	0.68331	+1.06506	-292	-310
19 08.3	+ 47.92	+ 72 55.1	+41 19 22.3	+0.65683	0.75211	+0.87332	-321	-280
11 36.3	-114.38	-174 04.4	-39 03 45.2	-0.62677	0.77750	-0.80614	-332	+267
19 04.2	+ 48.60	+ 73 57.5	+40 48 34.6	+0.65009	0.75798	+0.85766	-323	-277
0 29.2	- 4.80	- 7 18.0	+43 43 17.0	+0.68765	0.72392	+0.94990	-309	-293
2 07.9	- 21.01	- 31 58.5	+46 58 18.5	+0.72742	0.68359	+1.06411	-292	-310
17 30.2	+ 64.03	+ 97 26.6	+35 12 08.3	+0.57326	0.81808	+0.70074	-349	-245
19 09.4	+ 47.73	+ 72 38.3	+42 19 01.9	+0.66974	0.74057	+0.90436	-316	-286
17 47.4	+ 61.21	+ 93 09.0	+44 27 41.6	+0.69690	0.71493	+0.97478	-305	-297
0 23.6	- 3.87	- 5 53.3	+50 55 15.4	+0.77262	0.63167	+1.22314	-269	-330
15 51.2	+ 80.30	+122 12.0	+37 47 00	+0.60934	0.79134	+0.77000	-338	-260
2 03.0	- 20.21	- 30 45.5	+46 28 37.5	+0.72151	0.68987	+1.04586	-294	-308
0 59.1	- 9.71	- 14 47.0	+49 54 38.1	+0.76146	0.64531	+1.18000	-275	-325
19 25.3	+ 45.12	+ 68 40.1	+44 54 00	+0.70231	0.70953	+0.98982	-303	-300
0 42.9	- 7.05	- 10 43.4	+59 54 43.7	+0.86162	0.50260	+1.71433	-214	-368
18 57.1	+ 49.75	+ 75 43.0	+45 23 38.1	+0.70838	0.70344	+1.00703	-300	-302
23 55.0	+ 0.82	+ 1 15.1	+51 45 34.2	+0.78177	0.62026	+1.26040	-265	-334
18 01.9	+ 58.83	+ 89 31.8	+34 22 12.6	+0.56136	0.82631	+0.67935	-353	-239
0 47.5	- 7.80	- 11 52.3	+45 24 01.3	+0.70846	0.70335	+1.00726	-300	-302
0 53.4	- 8.78	- 13 21.5	+38 06 43.6	+0.61385	0.78782	+0.77917	-336	-262
15 51.4	+ 80.26	+122 08.8	+37 26 18.4	+0.60457	0.79500	+0.76047	-339	-258
0 09.3	- 1.54	- 2 20.2	+48 50 11	+0.74921	0.65948	+1.13607	-281	-320
7 43.4	- 76.12	-115 50.4	-31 57 10.7	-0.52617	0.84929	-0.61954	-362	+224
18 58.9	+ 49.46	+ 75 16.7	+39 58 02.1	+0.63893	0.76749	+0.83249	-327	-273
18 59.3	+ 49.40	+ 75 10.4	+39 57 27.6	+0.63879	0.76759	+0.83221	-327	-273
0 00.6	- 0.09	- 0 08.5	+42 56 12.0	+0.67797	0.73358	+0.92420	-313	-289
0 55.4	- 9.10	- 13 50.8	+44 51 48.6	+0.70186	0.70998	+0.98856	-303	-299
2 18.2	- 22.70	- 34 32.8	+49 36 13.0	+0.75796	0.64935	+1.16725	-277	-323
18 24.3	+ 55.15	+ 83 55.5	+42 24 10.7	+0.67087	0.73959	+0.90708	-316	-286
15 49.2	+ 80.63	+122 42.0	+45 29 43.7	+0.70965	0.70220	+1.01061	-300	-303
0 52.3	- 8.59	- 13 04.0	+52 22 56.0	+0.78845	0.61169	+1.28897	-261	-336
0 52.3	- 8.59	- 13 04.0	+52 22 54.8	+0.78845	0.61170	+1.28895	-261	-336
19 04.4	+ 48.56	+ 73 53.8	+41 41 18	+0.66160	0.74789	+0.88461	-319	-282
1 07.5	- 11.09	- 16 52.7	+52 23 54.3	+0.78862	0.61147	+1.28972	-261	-336

If the horizontal parallax, $\pi=8''.80/\text{distance}$, is known the parallax corrections are:

$\Delta\alpha=\frac{1}{\sin\delta}\pi\rho\cos\phi'\sin h\sec\delta$ $\Delta\delta=\pi\rho\cos\phi'(\tan\phi'\cos\delta-\cos h\sin\delta)$
 where $h=\theta-\alpha$ and θ =sidereal time at oh+sidereal equivalent of U.T.- λ .

Otherwise add $\Delta X=\Delta_{xy}\cos\theta$, $\Delta Y=\Delta_{xy}\sin\theta$, ΔZ to solar co-ordinates to eliminate parallax.

Place	Description	Altitude	Longitude
		m	h m s
Prague, Czechoslovakia	Stefánik Observatory	327	- 0 57 35.8
Prague, Czechoslovakia	Astronomical Institute of Charles University	267	- 0 57 35.1
Prague, Czechoslovakia	Technical University Observatory	237	- 0 57 40.92
Prague, Czechoslovakia	Observatory of K. Novak	218	- 0 57 38.04 a
Pretoria, South Africa	Radcliffe Observatory	1542	- 1 52 54.9 b
Pretoria, South Africa	Observatory of S. C. Venter	1268	- 1 52 52.7
Princeton, New Jersey	Princeton University Observatory	43	+ 4 58 35.59
Princeton, New Jersey	Observatory of Instruction, Princeton Univ.	65	+ 4 58 37.61 c
Providence, Rhode Island	Ladd Observatory, Brown University	69	+ 4 45 35.95 a
Pulkovo, R. S. F. S. R.	Pulkovo Observatory	75	- 2 01 18.57
Quebec, Canada	Quebec Observatory, Plains of Abraham	90	+ 4 44 52.71 c
Quito, Ecuador	National Observatory	2908	+ 5 13 58.20
Rarotonga, Cook Islands	Observatory of F. M. Bateson	—	+10 39 06.3 a
Reutlingen, Germany	Observatory of J. Herrmann	401	- 0 36 49.11
Richmond, Florida	Branch of United States Naval Observatory	—	+ 5 21 31.3 d
Richmond Hill, Ontario	David Dunlap Obs., University of Toronto	244	+ 5 17 41.3
Riga, Latvia	Polytechnic School Observatory	—	- 1 36 28.10
Rio de Janeiro, Brazil	National Observatory	33	+ 2 52 53.5 c
Rome, Italy	Rome Observatory, on Monte Mario	152	- 0 49 48.55 c
Rome, Italy	Royal University Observatory at Capitol	65	- 0 49 56.34 c
San Fernando, Spain	Naval Observatory	30	+ 0 24 49.30
Santa Clara, California	Observatory of University of Santa Clara	31	+ 8 07 48
Santiago, Chile	National Observatory, at San Bernardo	580	+ 4 42 45.09 c
Sendai, Japan	Tohoku University Observatory	36	- 9 23 29.49
Sidmouth, Devon	Norman Lockyer Observatory	171	+ 0 12 52.5 a
Simeis, Crimea, R. S. F. S. R.	Branch of Pulkovo Observatory	346	- 2 15 59.38
Skalná Pleso, Czechoslovakia	Astronomical Observatory	1783	- 1 20 58 8 b
Sonneberg, Germany	Sonneberg Observatory	640	- 0 44 46.19 a
South Bethlehem, Pennsylvania	Sayre Observatory, Lehigh University	110	+ 5 01 31.96 a
South Hadley, Massachusetts	Williston Observatory, Mount Holyoke Coll.	76	+ 4 50 18.99 a
Springfield, Vermont	Turret Observatory of Mrs. Beardsley	171	+ 4 49 55
St. Louis, Missouri	Washington University Observatory	178	+ 6 01 13.3
Stalinabad, Tadjik S. S. R.	Tadjik Astronomical Observatory	820	- 4 35 07.47
Stockholm, Sweden	Stockholm Observatory, at Saltsjöbaden	55	- 1 13 14 c
Strasbourg, France	University Observatory	156	- 0 31 04.25 a
Stuttgart, Germany	Swabian Observatory	344	- 0 36 47.39
Swarthmore, Pennsylvania	Sproul Observatory, Swarthmore College	63	+ 5 01 25.62 a
Sydney, New South Wales	Government Observatory	44	-10 04 49.19
Sydney, New South Wales	Riverview College Observatory	24	-10 04 37.99 a
Syracuse, New York	Syracuse University Observatory	160	+ 5 04 33.36
Tacubaya, Mexico	National Observatory	2297	+ 6 36 46.74
Tanakami, Japan	Yamamoto Observatory	165	- 9 03 57.4
Tartu, Estonian S. S. R.	Astronomical Observatory	67	- 1 46 53.18 c
Tashkent, Uzbek S. S. R.	Tashkent Observatory	477	- 4 37 10.47 c

a Equatorial refractor

b Equatorial reflector

c Transit or meridian circle

d Zenith telescope

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δx	ΔZ
h m	s	° '	° ' "					
0 57.6	- 9.46	- 14 23.9	+50 04 56	+0.76336	0.64299	+1.18720	-274	-326
0 57.6	- 9.46	- 14 23.8	+50 04 36.0	+0.76329	0.64306	+1.18696	-274	-326
0 57.7	- 9.48	- 14 25.2	+50 04 40.2	+0.76330	0.64304	+1.18701	-274	-326
0 57.6	- 9.47	- 14 24.5	+50 04 42.1	+0.76330	0.64303	+1.18703	-274	-326
1 52.9	- 18.55	- 28 13.7	-25 47 18	-0.43250	0.90120	-0.47992	-384	+185
1 52.9	- 18.54	- 28 13.2	-25 42 43	-0.43129	0.90174	-0.47829	-385	+184
19 01.4	+ 49.05	+ 74 38.9	+40 20 47.7	+0.64397	0.76322	+0.84375	-326	-275
19 01.4	+ 49.06	+ 74 39.4	+40 20 57.8	+0.64401	0.76320	+0.84383	-326	-275
19 14.4	+ 46.92	+ 71 24.0	+41 50 15.6	+0.66354	0.74616	+0.88927	-318	-283
2 01.3	- 19.93	- 30 19.6	+59 46 18.5	+0.86039	0.50472	+1.70469	-215	-367
19 15.1	+ 46.80	+ 71 13.2	+46 47 59.2	+0.72537	0.68579	+1.05772	-293	-309
18 46.0	+ 51.58	+ 78 29.6	- 0 14 00	-0.00405	1.00045	-0.00404	-427	+ 2
13 20.9	+104.99	+159 46.6	-21 12 17	-0.35943	0.93270	-0.38536	-398	+153
0 36.8	- 6.05	- 9 12.3	+48 29 25.9	+0.74527	0.66404	+1.12232	-283	-318
18 38.5	+ 52.82	+ 80 22.8	+25 37 28	+0.42983	0.90222	+0.47642	-385	-183
18 42.3	+ 52.19	+ 79 25.3	+43 51 46	+0.68942	0.72219	+0.95461	-308	-294
1 36.5	- 15.85	- 24 07.0	+56 57 09.3	+0.83456	0.54662	+1.52675	-233	-356
21 07.1	+ 28.40	+ 43 13.4	-22 53 42.2	-0.38663	0.92169	-0.41948	-393	+165
0 49.8	- 8.18	- 12 27.2	+41 55 19.2	+0.66464	0.74519	+0.89191	-318	-284
0 49.9	- 8.20	- 12 29.1	+41 53 33.6	+0.66425	0.74552	+0.89099	-318	-283
23 35.2	+ 4.08	+ 6 12.3	+36 27 42.0	+0.59100	0.80522	+0.73396	-344	-252
15 52.2	+ 80.13	+121 57.0	+37 20 45	+0.60329	0.79598	+0.75793	-340	-257
19 17.2	+ 46.45	+ 70 41.3	-33 33 44.2	-0.54974	0.83422	-0.65899	-356	+235
9 23.5	- 92.57	-140 52.4	+38 15 14.9	+0.61579	0.78629	+0.78315	-335	-263
23 47.1	+ 2.11	+ 3 13.1	+50 41 13.3	+0.77007	0.63485	+1.21299	-271	-329
2 16.0	- 22.34	- 33 59.8	+44 24 11.6	+0.69618	0.71565	+0.97280	-305	-297
1 21.0	- 13.30	- 20 14.7	+49 11 20.0	+0.75344	0.65501	+1.15027	-279	-321
0 44.8	- 7.35	- 11 11.5	+50 22 41.4	+0.76670	0.63906	+1.19974	-273	-327
18 58.5	+ 49.53	+ 75 23.0	+40 36 23.2	+0.64742	0.76029	+0.85154	-324	-276
19 09.7	+ 47.69	+ 72 34.7	+42 15 18.2	+0.66894	0.74130	+0.90239	-316	-285
19 10.1	+ 47.63	+ 72 28.7	+43 16 45	+0.68204	0.72919	+0.93534	-311	-291
17 58.8	+ 59.34	+ 90 18.3	+38 38 57.0	+0.62118	0.78203	+0.79432	-334	-265
4 35.1	- 45.20	- 68 46.9	+38 33 39.9	+0.62005	0.78307	+0.79182	-334	-265
1 13.2	- 12.03	- 18 18.5	+59 16 18	+0.85596	0.51225	+1.67099	-219	-365
0 31.1	- 5.10	- 7 46.1	+48 35 02.1	+0.74631	0.66279	+1.12601	-283	-318
0 36.8	- 6.04	- 9 11.8	+48 47 00.7	+0.74863	0.66020	+1.13395	-282	-319
18 58.6	+ 49.52	+ 75 21.4	+39 54 16.2	+0.63809	0.76819	+0.83064	-328	-272
10 04.8	- 99.36	-151 12.3	-33 51 41.1	-0.55402	0.83126	-0.66648	-355	+236
10 04.6	- 99.33	-151 09.5	-33 49 45.7	-0.55356	0.83157	-0.66568	-355	+236
18 55.4	+ 50.03	+ 76 08.3	+43 02 13.1	+0.67896	0.73208	+0.92744	-312	-290
17 23.2	+ 65.18	+ 99 11.7	+19 24 17.9	+0.33025	0.94388	+0.34989	-403	-141
9 04.0	- 89.36	-135 59.3	+34 58 18	+0.56996	0.82036	+0.69477	-350	-243
1 46.9	- 17.56	- 26 43.3	+58 22 47.2	+0.84790	0.52557	+1.61327	-224	-362
4 37.2	- 45.53	- 69 17.6	+41 19 30.4	+0.65690	0.75213	+0.87339	-321	-280

If the horizontal parallax, $\pi=8''.80/\text{distance}$, is known the parallax corrections are:

$$\Delta\alpha = \frac{\pi}{\sin \delta} \pi \times \rho \cos \phi' \sin h \sec \delta \quad \Delta\delta = \pi \times \rho \cos \phi' (\tan \phi' \cos \delta - \cos h \sin \delta)$$

where $h=\theta-\alpha$ and θ =sidereal time at 0^h+sidereal equivalent of U.T. $-\lambda$

Otherwise add $\Delta X=\Delta_{xy} \cos \theta$, $\Delta Y=\Delta_{xy} \sin \theta$, ΔZ to solar co-ordinates to eliminate parallax.

Place	Description	Altitude	Longitude
		m	h m s
Teramo, Italy	Collurania Observatory	398	− 0 54 56
Tokyo, Japan	Tokyo Astronomical Observatory, at Mitaka	59	− 9 18 10.10 c
Tomsk, R. S. F. S. R.	University Observatory	130	− 5 39 47.16
Tonantzintla, Mexico	Observatorio Astrofisico Nacional	2150	+ 6 33 15.32
Toronto, Canada	Meteorological Observatory	116	+ 5 17 35.60 c
Toruń, Poland	Copernicus University Obs., at Piwnice	90	− 1 14 13.4
Toulouse, France	University Observatory	195	− 0 05 51.01 c
Trieste	Astronomical Observatory	67	− 0 55 04.9
Tsingtao, China	Observatory of Tsingtao	78	− 8 01 16.71 c
Tucson, Arizona	Steward Observatory, University of Arizona	757	+ 7 23 47.68 b
Turin, Italy	Pino Torinese Observatory	618	− 0 31 05.95 c
Turku, Finland	University Observatory	28	− 1 28 55.03 b
Uccle, Belgium	Royal Observatory	105	− 0 17 25.97 c
Ukiah, California	International Latitude Observatory	200	+ 8 12 50.3 d
University, Alabama	Observatory, University of Alabama	87	+ 5 50 10.2
Uppsala, Sweden	University Astronomical Observatory	21	− 1 10 30.17 a
Urbana, Illinois	Observatory, University of Illinois	236	+ 5 52 53.90 a
Utrecht, Netherlands	Sonnenborgh Observatory	14	− 0 20 31.01 a
Utrecht, Netherlands	Observatory of J. C. Pfeiffer	0	− 0 20 28.0
Venice, Italy	Observatory of the Nautical Institute	15	− 0 49 22.12 c
Victoria, British Columbia . . .	Dominion Astrophysical Observatory	229	+ 8 13 40.17 b
Vienna, Austria	Kuffner Observatory	293	− 1 05 10.96
Vienna, Austria	University Observatory, since 1879	240	− 1 05 21.35 c
Vilnius, Lithuanian S. S. R. . . .	University Observatory	122	− 1 41 08.76 a
Wallington, Surrey	Observatory of W. Green	—	+ 0 00 30.40 a
Warsaw, Poland	Observatory of the Technical University	144	− 1 24 02.4
Warsaw, Poland	University Observatory	121	− 1 24 07.26
Washington, D. C.	United States Naval Observatory	86*	+ 5 08 15.78 a
Washington, D. C.	Georgetown College Observatory	62	+ 5 08 18.3 a
Washington, D. C.	Smithsonian Astrophysical Observatory	10	+ 5 08 06.24
Weesp, Netherlands	Observatory of J. van Diggelen	—	− 0 20 10.14
Wellesley, Massachusetts	Whitin Observatory, Wellesley College	61	+ 4 45 13.3
Wellington, New Zealand	Carter Observatory	129	−11 39 03.69 a
Wellington, New Zealand	Observatory of R. C. Hayes	180	−11 38 58.8
Williams Bay, Wisconsin	Yerkes Observatory, University of Chicago	334	+ 5 54 13.24 a
Williamstown, Massachusetts . .	Field Memorial Observatory, Williams Coll.	213	+ 4 52 50
Woodstock, Maryland	Woodstock College Observatory	121	+ 5 07 30.0
Wroclaw, Poland	University Observatory	117	− 1 08 21.22
Wurtzburg, Germany	University Observatory	200	− 0 39 44.71
Zagreb, Yugoslavia	Observatory of Faculty of Technology	146	− 1 04 05.11
Zô-sê, China	Astronomical Observatory	100	− 8 04 44.75 a
Zürich, Switzerland	Observatory of Swiss Polytechnic School	469	− 0 34 12.26 c

a Equatorial refractor b Equatorial reflector c Transit or meridian circle d Zenith telescope

*Bench mark in clock house; $\lambda = +5^{\text{h}} 08^{\text{m}} 15^{\text{s}}.78$, $\phi = +38^{\circ} 55' 14''.0$.

$-\lambda$	Redn. of S. T.	Longitude	Latitude	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	Δy	ΔZ
h m	s	° '	° ' "					
0 54.9	- 9.02	- 13 44.0	+42 39 27	+0.67414	0.73660	+0.91521	-314	-288
9 18.2	- 91.69	-139 32.5	+35 40 21.4	+0.57990	0.81330	+0.71302	-347	-247
5 39.8	- 55.82	- 84 56.8	+56 28 06.3	+0.82993	0.55370	+1.49888	-236	-354
17 26.7	+ 64.60	+ 98 18.8	+19 01 57.9	+0.32414	0.94599	+0.34265	-404	-138
18 42.4	+ 52.17	+ 79 23.9	+43 40 00.8	+0.68694	0.72454	+0.94810	-309	-293
1 14.2	- 12.19	- 18 33.3	+53 05 44	+0.79599	0.60179	+1.32271	-257	-340
0 05.9	- 0.96	- 1 27.8	+43 36 44.1	+0.68626	0.72521	+0.94629	-309	-293
0 55.1	- 9.05	- 13 46.2	+45 38 35.5	+0.71142	0.70034	+1.01583	-299	-304
8 01.3	- 79.06	-120 19.2	+36 04 11.3	+0.58550	0.80925	+0.72351	-345	-250
16 36.2	+ 72.90	+110 56.9	+32 13 59.4	+0.53035	0.84680	+0.62630	-361	-226
0 31.1	- 5.11	- 7 46.5	+45 02 16.3	+0.70407	0.70790	+0.99459	-302	-300
1 28.9	- 14.61	- 22 13.8	+60 27 08.7	+0.86631	0.49441	+1.75221	-211	-370
0 17.4	- 2.86	- 4 21.5	+50 47 54.7	+0.77129	0.63334	+1.21781	-270	-329
15 47.2	+ 80.96	+123 12.6	+39 08 12.0	+0.62779	0.77671	+0.80827	-331	-268
18 09.8	+ 57.52	+ 87 32.6	+33 12 33	+0.54457	0.83753	+0.65021	-357	-232
1 10.5	- 11.58	- 17 37.5	+59 51 29.4	+0.86114	0.50341	+1.71061	-215	-367
18 07.1	+ 57.97	+ 88 13.5	+40 06 20.2	+0.64079	0.76596	+0.83658	-327	-273
0 20.5	- 3.37	- 5 07.8	+52 05 09.6	+0.78528	0.61577	+1.27528	-263	-335
0 20.5	- 3.36	- 5 07.0	+52 04 20.9	+0.78513	0.61595	+1.27466	-263	-335
0 49.4	- 8.11	- 12 20.5	+45 26 10.5	+0.70889	0.70290	+1.00852	-300	-302
15 46.3	+ 81.10	+123 25.0	+48 31 15.7	+0.74560	0.66362	+1.12353	-283	-318
1 05.2	- 10.71	- 16 17.7	+48 12 46.7	+0.74204	0.66764	+1.11143	-285	-317
1 05.4	- 10.74	- 16 20.3	+48 13 55.1	+0.74225	0.66739	+1.11217	-285	-317
1 41.1	- 16.62	- 25 17.2	+54 40 59.1	+0.81232	0.57941	+1.40198	-247	-347
23 59.5	+ 0.08	+ 0 07.6	+51 21 37.0	+0.77743	0.62570	+1.24249	-267	-332
1 24.0	- 13.80	- 21 00.6	+52 13 21	+0.78675	0.61390	+1.28157	-262	-336
1 24.1	- 13.82	- 21 01.8	+52 13 04.6	+0.78670	0.61396	+1.28135	-262	-336
18 51.7	+ 50.64	+ 77 03.9	+38 55 14.0	+0.62486	0.77906	+0.80206	-332	-267
18 51.7	+ 50.65	+ 77 04.6	+38 54 26.0	+0.62467	0.77921	+0.80168	-332	-267
18 51.9	+ 50.61	+ 77 01.6	+38 53 17.3	+0.62441	0.77941	+0.80113	-333	-266
0 20.2	- 3.31	- 5 02.5	+52 18 37.0	+0.78768	0.61268	+1.28563	-261	-336
19 14.8	+ 46.85	+ 71 18.3	+42 17 37.1	+0.66943	0.74084	+0.90361	-316	-286
11 39.1	-114.84	-174 45.9	-41 17 03.9	-0.65634	0.75256	-0.87214	-321	+280
11 39.0	-114.82	-174 44.7	-41 17 00.2	-0.65633	0.75258	-0.87211	-321	+280
18 05.8	+ 58.19	+ 88 33.3	+42 34 12.6	+0.67302	0.73762	+0.91241	-315	-287
19 07.2	+ 48.10	+ 73 12.5	+42 42 30	+0.67477	0.73598	+0.91684	-314	-288
18 52.5	+ 50.51	+ 76 52.5	+39 20 05	+0.63045	0.77452	+0.81399	-330	-269
1 08.4	- 11.23	- 17 05.3	+51 06 42.1	+0.77473	0.62910	+1.23150	-268	-331
0 39.7	- 6.53	- 9 56.2	+49 47 27.6	+0.76008	0.64687	+1.17501	-276	-324
1 04.1	- 10.53	- 16 01.3	+45 49 32.3	+0.71365	0.69807	+1.02232	-298	-304
8 04.7	- 79.63	-121 11.2	+31 05 47.6	+0.51348	0.85708	+0.59910	-366	-219
0 34.2	- 5.62	- 8 33.1	+47 22 38.3	+0.73227	0.67845	+1.07932	-289	-312

If the horizontal parallax, $\pi=8''.80/\text{distance}$, is known the parallax corrections are:

$$\Delta\alpha = \pi \times \rho \cos \phi' \sin h \sec \delta \quad \Delta\delta = \pi \times \rho \cos \phi' (\tan \phi' \cos \delta - \cos h \sin \delta)$$

where $h = \theta - \alpha$ and $\theta = \text{sidereal time at } 0^h + \text{sidereal equivalent of U.T.} - \lambda$

Otherwise add $\Delta X = \Delta x_y \cos \theta$, $\Delta Y = \Delta x_y \sin \theta$, ΔZ to solar co-ordinates to eliminate parallax.

INDEX LIST

Actual names of observatories are in bold type.
Names of owners of private observatories are in italics.

Name, Etc.	Place	Name, Etc.	Place
Åbo	Turku	Drake University	Des Moines
Agassiz Station	Harvard	Dudley	Albany
Alabama, Univ. of	University	Dunsink	Dublin
Ann Arbor (Branch)	Lake Angelus	Dyer	Nashville
Ann Arbor (Branch)	Portage Lake	Eidgenössischen Sternwarte	Zürich
Archenhold	Berlin-Treptow	Engelhardt	Kazan
Arizona, Univ. of	Tucson	Fabra	Barcelona
Baden	Heidelberg	Field	Williamstown
Batavia	Jakarta	Flammarion	Juvisy
<i>Bateson</i>	Rarotonga	Floirac	Bordeaux
<i>Beardsley</i>	Springfield	Florence	Arcetri
Bergedorf	Hamburg	Flower	Philadelphia
Bloomington (Branch)	Brooklyn	Franklin Institute	Philadelphia
Bosscha	Lembang	Fuertes	Ithaca
Bouzaréah	Algiers	<i>Gayfer</i>	Cleethorpes
Boyden Station	Bloemfontein	Georgetown College	Washington
Brackett	Claremont	Goethe Link	Brooklyn
Bradley	Decatur	Goodsell	Northfield
Brera	Milan	<i>Green</i>	Wallington
Breslau	Wroclaw	Haig	Dehra Dun
Brown University	Providence	Harvard College	Cambridge
<i>Bruijn</i>	Leiden	<i>Hayes</i>	Wellington
Brussels	Uccle	<i>Hegvad</i>	Copenhagen
Cajigal	Caracas	Hendaye	Abbadia
Cambridge (Branch)	Bloemfontein	<i>Herrmann</i>	Reutlingen
California Inst. of Tech.	Mount Palomar	India, Survey of	Dehra Dun
California, Univ. of	Berkeley	Indiana, Univ. of	Bloomington
California, Univ. of	Mount Hamilton	Indiana, Univ. of	Brooklyn
Capodimonte	Naples	International Latitude	Carloforte
Carleton College	Northfield	International Latitude	Gaithersburg
Carnegie Institution	Mount Wilson	International Latitude	Jakarta
Carter	Wellington	International Latitude	Kitab
<i>Caunter</i>	Billingshurst	International Latitude	Mizusawa
Chabot	Oakland	International Latitude	Ukiah
Chamberlin	Denver	Illinois, Univ. of	Urbana
Charles University	Prague	Iowa, Univ. of	Iowa City
Chicago, Univ. of	Williams Bay	<i>Jaakola</i>	Huittinen
Columbia University	New York	Kapteyn Laboratory	Groningen
Commonwealth	Canberra	<i>Kenskamp</i>	Hardenberg
Copernicus University	Torun	<i>Kierulff</i>	Copenhagen
Cordoba (Branch)	Bosque Alegre	Kirkwood	Bloomington
Cornell University	Ithaca	Königstuhl	Heidelberg
<i>Couling</i>	Dunedin	Konkoly	Budapest
<i>Darnell</i>	Copenhagen	Kuffner	Vienna
Dartmouth College	Hanover	Kwasan	Kyoto
David Dunlap	Richmond Hill		
Dearborn	Evanston		
De Pauw University	Greencastle		
<i>Diggelen, van</i>	Weesp		
Dominion	Ottawa		
Dominion Astrophysical	Victoria		

INDEX LIST

Actual names of observatories are in bold type.

Names of owners of private observatories are in *italics*.

Name, Etc.	Place
Ladd	Providence
<i>Lange, de</i>	Blaricum
La Plata	Eva Perón
Lawrence College	Appleton
Leander McCormick	Charlottesville
Lehigh University	South Bethlehem
Leuschner	Berkeley
Lick	Mount Hamilton
Link	Brooklyn
London, Univ. of	Mill Hill
Longchamp	Marseilles
Louisiana, Univ. of	Baton Rouge
Lowell	Flagstaff

McDonald	Fort Davis
McGill University	Montreal
McKim	Greencastle
McMath-Hulbert	Lake Angelus
McMillin	Columbus
Maine, Univ. of	Orono
<i>Mak</i>	Driehuis-Velsen
<i>Malsch</i>	Karlsruhe
Manila	Baguio City
Masaryk University	Brno
Mazelspoort	Bloemfontein
Melton	Columbia
<i>Meulen, van der</i>	Hoorn
Michigan, Univ. of	Ann Arbor
Michigan, Univ. of (Branch)	Lake Angelus
Michigan, Univ. of (Branch)	Portage Lake
<i>Milicévic</i>	Blaca
<i>Millard</i>	Portland
Minnesota	Minneapolis
Mississippi, Univ. of	Oxford
Mitaka	Tokyo
Mitchell	Nantucket
Monte Mario	Rome
Mont Gros	Nice
Morrison	Fayette
Mount Holyoke College	South Hadley
Mount Locke	Fort Davis
Mount Stromlo	Canberra
<i>Muijtjens</i>	Nuth

New Brunswick, Univ. of	Fredericton
Nizamiah	Hyderabad
Norman Lockyer	Sidmouth
Northwestern Univ.	Evanston
<i>Novak</i>	Prague

<i>Ogilvie</i>	Carnoustie
Ohio State Univ.	Columbus
Ohio Wesleyan Univ	Delaware
Oklahoma, Univ. of	Norman

Name, Etc.	Place
Ole Römer	Aarhus
Otago Institute	Dunedin
Padua, Univ. of	Asiago
Pennsylvania, Univ. of	Philadelphia
Perkins	Delaware
<i>Pfeiffer</i>	Utrecht
Philadelphia (Branch)	Wynnewood
Pino Torinese	Turin
Pittsburgh, Univ. of	Allegheny
Piwnice	Toruń
Pomona College	Claremont
<i>Power</i>	Palo Alto
Pulkovo (Branch)	Simeis

<i>Raalten, van</i>	Harderwijk
Radcliffe	Pretoria
<i>Rasmussen</i>	Helsingör
Remeis	Bamberg
Riverview College	Sydney
Royal Greenwich (Branch)	Abinger
Royal Greenwich	Herstmonceux

San Bernardo	Santiago
Saltsjöbaden	Stockholm
Sayre	South Bethlehem
Scott College	Decatur
<i>Schmidt, D.</i>	Bussum
<i>Schmidt, M.</i>	Groningen
Shattuck	Hanover
<i>Sill</i>	Mamaroneck
Smith	Beloit
Smith	Geneva
Smith College	Northampton
Smithsonian	Mount Wilson
Smithsonian	Washington
Sonnenborgh	Utrecht
South Carolina, Univ. of	Columbia
Sproul	Swarthmore
<i>Steavenson</i>	Cambridge
Stefánik	Prague
Steward	Tucson
Sternberg Institute	Moscow
<i>Stevens</i>	Larchmont
Strawbridge	Haverford

Tadjik	Stalinabad
Tapada	Lisbon
Texas, Univ. of	Fort Davis
Tilanus	Amsterdam
Tohoku University	Sendai
Toronto, Univ. of	Richmond Hill
Toulouse	Pic du Midi
Turret	Springfield

INDEX LIST

Actual names of observatories are in bold type.

Names of owners of private observatories are in italics.

Name, Etc.	Place	Name, Etc.	Place
Underwood	Appleton	Vleck, Van	Middletown
Union	Johannesburg	<i>Walker</i>	Haarlem
Union (Annexe)	Hartebeespoort	Warner and Swasey	Cleveland
Urania	Copenhagen	Washburn	Madison
Ursa	Helsinki	Washington University	St. Louis
U. S. Naval	Washington	Wesleyan University	Middletown
U. S. Naval (Branch)	Richmond	Whitin	Wellesley
Vassar College	Poughkeepsie	<i>Wieth-Knudsen</i>	Copenhagen
Vanderbilt University	Nashville	Williams College	Williamstown
<i>Vastenholt</i>	Beverwijk	Williston	South Hadley
Vatican	Castel Gandolfo	Wisconsin, Univ. of	Madison
<i>Venter</i>	Pretoria	Yale University	New Haven
Vicenza	Asiago	Yale (Branch)	Johannesburg
Ville-Marie	Montreal	Yerkes	Williams Bay
Virginia, Univ. of	Charlottesville		

APPARENT PLACE OF POLARIS, 1958
FOR THE UPPER TRANSIT AT GREENWICH

Nb				α Ursæ Minoris				Mag. 2.12				Sp. F8			
JANUARY				FEBRUARY				MARCH							
U. T.	Right Ascension	Declination	Short Period Terms	U. T.	Right Ascension	Declination	Short Period Terms	U. T.	Right Ascension	Declination	Short Period Terms				
	h m 1 54	° ' +89 04	Units s " 0.01 0.01		h m 1 54	° ' +89 04	Units s " 0.01 0.01		h m 1 53	° ' +89 04	Units s " 0.01 0.01				
	s "				s "				s "						
0.8	81.66	24.70	-21 - 7	0.7	41.94	26.66	+22 - 6	0.6	68.27	23.15	+24 - 5				
1.8	80.49	24.86	- 9 - 9	1.7	40.63	26.62	+26 - 2	1.6	67.25	22.94	+26 - 1				
2.8	79.30	25.01	+ 4 - 9	2.7	39.32	26.57	+25 + 2	2.6	66.25	22.73	+20 + 3				
3.8	78.10	25.16	+17 - 7	3.7	38.02	26.52	+16 + 5	3.6	65.27	22.51	+ 8 + 6				
4.8	76.90	25.30	+26 - 4	4.7	36.72	26.46	+ 3 + 7	4.6	64.30	22.29	- 6 + 7				
5.8	75.68	25.43	+28 0	5.7	35.42	26.39	-12 + 7	5.6	63.36	22.06	-20 + 6				
6.8	74.45	25.56	+23 + 4	6.7	34.13	26.32	-25 + 6	6.6	62.43	21.83	-29 + 4				
7.8	73.21	25.68	+12 + 6	7.7	32.85	26.24	-30 + 3	7.6	61.52	21.60	-31 + 1				
8.8	71.96	25.80	- 3 + 8	8.7	31.57	26.15	-28 0	8.6	60.63	21.36	-25 - 3				
9.8	70.71	25.91	-17 + 7	9.7	30.30	26.06	-19 - 4	9.6	59.76	21.12	-12 - 5				
10.8	69.44	26.01	-27 + 5	10.7	29.04	25.96	- 5 - 5	10.6	58.91	20.87	+ 6 - 6				
11.8	68.17	26.11	-30 + 1	11.7	27.79	25.85	+11 - 6	11.6	58.08	20.62	+21 - 5				
12.8	66.89	26.20	-26 - 2	12.7	26.55	25.74	+25 - 4	12.6	57.27	20.37	+32 - 2				
13.8	65.60	26.28	-14 - 5	13.7	25.31	25.62	+35 - 2	13.6	56.48	20.11	+38 + 1				
14.8	64.31	26.36	+ 1 - 6	14.7	24.09	25.49	+37 + 1	14.6	55.72	19.84	+37 + 4				
15.8	63.02	26.43	+16 - 6	15.7	22.87	25.36	+33 + 4	15.6	54.97	19.57	+29 + 6				
16.8	61.72	26.49	+28 - 4	16.7	21.67	25.22	+24 + 7	16.6	54.25	19.30	+17 + 8				
17.8	60.41	26.55	+35 - 1	17.7	20.48	25.08	+11 + 8	17.6	53.54	19.03	+ 3 + 8				
18.8	59.10	26.60	+35 + 2	18.7	19.30	24.93	- 1 + 7	18.6	52.86	18.75	-10 + 7				
19.8	57.79	26.64	+30 + 5	19.7	18.13	24.78	-13 + 6	19.6	52.21	18.47	-19 + 5				
20.7	56.48	26.68	+19 + 7	20.7	16.98	24.62	-23 + 4	20.6	51.57	18.19	-27 + 2				
21.7	55.16	26.71	+ 7 + 8	21.7	15.84	24.45	-29 + 1	21.6	50.96	17.91	-29 - 1				
22.7	53.84	26.73	- 7 + 7	22.7	14.71	24.28	-31 - 2	22.6	50.37	17.62	-28 - 4				
23.7	52.51	26.75	-18 + 5	23.7	13.60	24.10	-27 - 5	23.6	49.81	17.33	-22 - 6				
24.7	51.19	26.76	-27 + 3	24.6	12.50	23.92	-20 - 8	24.6	49.27	17.04	-12 - 8				
25.7	49.86	26.77	-32 0	25.6	11.42	23.74	- 9 - 9	25.6	48.76	16.74	- 1 - 9				
26.7	48.54	26.77	-32 - 4	26.6	10.35	23.55	+ 4 - 9	26.6	48.27	16.45	+12 - 8				
27.7	47.22	26.76	-26 - 7	27.6	09.30	23.35	+15 - 7	27.6	47.80	16.15	+20 - 6				
28.7	45.89	26.74	-16 - 9	28.6	08.27	23.15	+24 - 5	28.6	47.36	15.85	+24 - 3				
29.7	44.57	26.72	- 3 - 9	29.6	07.25	22.94	+26 - 1	29.6	46.94	15.54	+22 + 1				
30.7	43.26	26.69	+10 - 8	30.6	06.25	22.73	+20 + 3	30.6	46.55	15.24	+12 + 4				
31.7	41.94	26.66	+22 - 6	31.6	05.27	22.51	+ 8 + 6	31.6	46.18	14.93	- 1 + 6				

δ	Sec δ	Tan δ	δ	Sec δ	Tan δ
° ' "			° ' "		
+89 04 10	+61.574	+61.566	+89 04 20	+61.759	+61.751
+89 04 20	+61.759	+61.751	+89 04 30	+61.944	+61.936

Mean Place 1958.0: α=1^h 54^m 15^s.65; δ=+89° 04' 05".40

FOR THE UPPER TRANSIT AT GREENWICH

Nb	α Ursæ Minoris				Mag. 2.12				Sp. F8			
APRIL				MAY				JUNE				
U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms	
	h m 1 53	° ' +89 04	Units s '' 0.01 0.01		h m 1 53	° ' +89 03	Units s '' 0.01 0.01		h m 1 54	° ' +89 03	Units s '' 0.01 0.01	
	s	"			s	"			s	"		
0.6	46.18	14.93	- 1 + 6	0.5	46.73	65.55	-32 + 2	0.4	09.00	57.64	- 5 - 7	
1.6	45.83	14.62	-16 + 6	1.5	47.13	65.25	-34 - 1	1.4	10.02	57.44	+12 - 7	
2.6	45.51	14.31	-28 + 5	2.5	47.56	64.95	-27 - 4	2.4	11.05	57.25	+27 - 4	
3.5	45.22	14.00	-33 + 1	3.5	48.00	64.66	-13 - 6	3.4	12.09	57.06	+36 - 1	
4.5	44.95	13.68	-31 - 2	4.5	48.47	64.37	+ 4 - 7	4.4	13.15	56.88	+38 + 3	
5.5	44.70	13.37	-19 - 5	5.5	48.97	64.08	+21 - 5	5.4	14.22	56.70	+32 + 6	
6.5	44.48	13.06	- 4 - 6	6.5	49.48	63.79	+33 - 3	6.4	15.31	56.53	+21 + 8	
7.5	44.29	12.74	+13 - 6	7.5	50.02	63.51	+39 + 1	7.4	16.42	56.36	+ 7 + 9	
8.5	44.12	12.43	+29 - 4	8.5	50.58	63.22	+37 + 4	8.4	17.54	56.20	- 6 + 8	
9.5	43.98	12.11	+38 - 1	9.4	51.16	62.94	+28 + 7	9.4	18.67	56.04	-18 + 6	
10.5	43.86	11.80	+39 + 3	10.4	51.76	62.67	+16 + 9	10.4	19.81	55.89	-25 + 3	
11.5	43.76	11.48	+34 + 6	11.4	52.38	62.39	+ 1 + 9	11.4	20.97	55.74	-28 0	
12.5	43.69	11.16	+23 + 8	12.4	53.03	62.12	-11 + 8	12.4	22.14	55.60	-27 - 3	
13.5	43.65	10.84	+ 9 + 9	13.4	53.70	61.85	-21 + 5	13.4	23.31	55.46	-21 - 6	
14.5	43.63	10.53	- 4 + 8	14.4	54.38	61.59	-27 + 2	14.4	24.50	55.32	-10 - 7	
15.5	43.64	10.21	-15 + 6	15.4	55.09	61.32	-28 - 1	15.3	25.70	55.19	0 - 8	
16.5	43.67	09.89	-23 + 4	16.4	55.82	61.06	-24 - 4	16.3	26.91	55.07	+13 - 7	
17.5	43.73	09.57	-28 + 1	17.4	56.57	60.81	-17 - 6	17.3	28.13	54.95	+22 - 5	
18.5	43.81	09.26	-27 - 2	18.4	57.34	60.56	- 7 - 8	18.3	29.37	54.84	+26 - 2	
19.5	43.92	08.94	-23 - 5	19.4	58.13	60.31	+ 6 - 8	19.3	30.61	54.73	+25 + 1	
20.5	44.05	08.63	-14 - 7	20.4	58.94	60.06	+16 - 7	20.3	31.86	54.62	+16 + 4	
21.5	44.21	08.31	- 4 - 8	21.4	59.76	59.82	+22 - 4	21.3	33.12	54.52	+ 4 + 6	
22.5	44.39	08.00	+ 8 - 8	22.4	60.60	59.58	+26 - 1	22.3	34.40	54.43	-11 + 6	
23.5	44.60	07.69	+18 - 6	23.4	61.47	59.35	+21 + 2	23.3	35.68	54.34	-24 + 5	
24.5	44.83	07.38	+24 - 4	24.4	62.35	59.12	+10 + 5	24.3	36.96	54.26	-31 + 2	
25.5	45.09	07.07	+24 0	25.4	63.24	58.90	- 3 + 6	25.3	38.26	54.18	-32 - 1	
26.5	45.37	06.76	+17 + 3	26.4	64.16	58.68	-18 + 5	26.3	39.56	54.11	-25 - 4	
27.5	45.67	06.46	+ 4 + 5	27.4	65.10	58.46	-29 + 4	27.3	40.87	54.04	-11 - 6	
28.5	46.00	06.16	-10 + 6	28.4	66.05	58.25	-33 0	28.3	42.19	53.98	+ 4 - 7	
29.5	46.35	05.85	-23 + 5	29.4	67.02	58.04	-31 - 3	29.3	43.51	53.92	+20 - 6	
30.5	46.73	05.55	-32 + 2	30.4	68.00	57.84	-21 - 6	30.3	44.84	53.87	+32 - 3	
31.5	47.13	05.25	-34 - 1	31.4	69.00	57.64	- 5 - 7	31.3	46.18	53.83	+36 + 1	

δ	Sec δ	Tan δ	δ	Sec δ	Tan δ
° ' "			° ' "		
+89 03 50	+61.209	+61.201	+89 04 10	+61.574	+61.566
+89 04 00	+61.391	+61.383	+89 04 20	+61.759	+61.751

Mean Place 1958.0: $\alpha=1^h 54^m 15^s.65$; $\delta=+89^\circ 04' 05''.40$

APPARENT PLACE OF POLARIS, 1958
FOR THE UPPER TRANSIT AT GREENWICH

Nb				α Ursæ Minoris				Mag. 2.12				Sp. F8			
JULY				AUGUST				SEPTEMBER							
U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms
	h m 1 54	° ' " +89 03	Units s " 0.01 0.01		h m 1 55	° ' " +89 03	Units s " 0.01 0.01		h m 1 56	° ' " +89 04	Units s " 0.01 0.01		h m 1 56	° ' " +89 04	Units s " 0.01 0.01
	s	"			s	"			s	"			s	"	
0.3	44.84	53.87	+32 - 3	0.2	27.34	54.97	+17 + 8	0.1	06.32	00.84	-23 + 4				
1.3	46.18	53.83	+36 + 1	1.2	28.70	55.09	+ 4 + 8	1.1	07.42	01.10	-28 + 1				
2.3	47.52	53.79	+34 + 4	2.2	30.05	55.21	- 8 + 7	2.1	08.52	01.36	-28 - 2				
3.3	48.86	53.76	+25 + 7	3.2	31.40	55.34	-19 + 5	3.1	09.61	01.62	-23 - 5				
4.3	50.21	53.73	+13 + 8	4.2	32.75	55.47	-26 + 2	4.1	10.68	01.89	-14 - 7				
5.3	51.56	53.71	- 1 + 8	5.2	34.09	55.61	-29 - 1	5.1	11.74	02.17	- 4 - 9				
6.3	52.92	53.69	-13 + 7	6.2	35.42	55.76	-27 - 3	6.1	12.78	02.44	+ 7 - 8				
7.3	54.29	53.68	-22 + 4	7.2	36.75	55.91	-20 - 6	7.1	13.82	02.72	+18 - 7				
8.3	55.65	53.67	-28 + 1	8.2	38.08	56.06	-10 - 8	8.1	14.84	03.00	+24 - 4				
9.3	57.02	53.67	-29 - 2	9.2	39.40	56.22	+ 2 - 9	9.1	15.84	03.29	+24 0				
10.3	58.39	53.67	-25 - 5	10.2	40.71	56.38	+13 - 8	10.1	16.83	03.58	+18 + 3				
11.3	59.77	53.68	-16 - 7	11.2	42.01	56.55	+22 - 5	11.1	17.80	03.88	+ 6 + 5				
12.3	61.15	53.70	- 5 - 8	12.2	43.31	56.72	+25 - 2	12.1	18.76	04.17	- 9 + 6				
13.3	62.53	53.72	+ 8 - 8	13.2	44.60	56.90	+23 + 2	13.1	19.71	04.47	-22 + 5				
14.3	63.91	53.74	+18 - 6	14.2	45.89	57.08	+14 + 5	14.1	20.64	04.77	-31 + 3				
15.3	65.29	53.77	+26 - 4	15.2	47.16	57.27	+ 1 + 6	15.1	21.56	05.08	-32 0				
16.3	66.67	53.81	+26 0	16.2	48.43	57.46	-14 + 7	16.1	22.46	05.39	-26 - 3				
17.3	68.06	53.85	+21 + 3	17.2	49.69	57.65	-25 + 5	17.1	23.35	05.70	-12 - 5				
18.3	69.44	53.90	+ 9 + 6	18.2	50.94	57.85	-30 + 2	18.1	24.23	06.01	+ 4 - 6				
19.3	70.83	53.95	- 5 + 7	19.2	52.18	58.05	-29 - 1	19.1	25.09	06.33	+21 - 5				
20.3	72.21	54.00	-18 + 6	20.2	53.41	58.26	-20 - 4	20.1	25.93	06.65	+32 - 2				
21.2	73.59	54.06	-28 + 4	21.2	54.63	58.47	- 6 - 6	21.1	26.76	06.97	+37 + 1				
22.2	74.97	54.13	-31 0	22.2	55.85	58.69	+10 - 6	22.1	27.57	07.29	+35 + 4				
23.2	76.36	54.20	-28 - 3	23.2	57.05	58.91	+25 - 4	23.1	28.36	07.62	+27 + 7				
24.2	77.74	54.28	-16 - 5	24.2	58.25	59.14	+34 - 1	24.1	29.13	07.95	+14 + 9				
25.2	79.12	54.36	- 1 - 6	25.2	59.43	59.37	+36 + 2	25.1	29.89	08.29	+ 1 + 8				
26.2	80.50	54.45	+14 - 6	26.2	60.61	59.60	+31 + 5	26.1	30.63	08.62	-11 + 7				
27.2	81.87	54.54	+27 - 4	27.1	61.77	59.84	+21 + 7	27.1	31.36	08.96	-20 + 5				
28.2	83.24	54.64	+34 - 1	28.1	62.93	60.08	+ 9 + 8	28.1	32.07	09.30	-26 + 2				
29.2	84.61	54.74	+34 + 3	29.1	64.07	60.33	- 4 + 8	29.1	32.76	09.64	-27 - 1				
30.2	85.98	54.85	+28 + 6	30.1	65.20	60.58	-16 + 6	30.1	33.43	09.99	-23 - 4				
31.2	87.34	54.97	+17 + 8	31.1	66.32	60.84	-23 + 4	31.1	34.09	10.33	-17 - 6				

δ	Sec δ	Tan δ	δ	Sec δ	Tan δ
° ' "			° ' "		
+89 03 50	+61.209	+61.201	+89 04 10	+61.574	+61.566
+89 04 00	+61.391	+61.383	+89 04 20	+61.759	+61.751

Mean Place 1958.0: α=1^h 54^m 15^s.65; δ= +89° 04' 05''.40

FOR THE UPPER TRANSIT AT GREENWICH

Nb	α Ursæ Minoris			Mag. 2.12				Sp. F8			
OCTOBER				NOVEMBER				DECEMBER			
U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms	U. T.	Right Ascension	Decli- nation	Short Period Terms
	h m 1 56	° ' " 89 04	Units s " 0.01 0.01		h m 1 56	° ' " +89 04	Units s " 0.01 0.01		h m 1 56	° ' " +89 04	Units s " 0.01 0.01
	s	"			s	"			s	"	
1.1	34.09	10.33	-17 - 6	0.9	44.65	21.65	+19 - 6	0.9	35.18	32.09	+19 + 2
2.1	34.72	10.68	- 7 - 8	1.9	44.66	22.02	+24 - 3	1.9	34.53	32.40	+ 9 + 4
3.0	35.34	11.03	+ 3 - 8	2.9	44.64	22.39	+22 0	2.9	33.85	32.70	- 4 + 5
4.0	35.94	11.39	+14 - 7	3.9	44.61	22.76	+15 + 3	3.9	33.16	33.00	-19 + 5
5.0	36.51	11.74	+22 - 5	4.9	44.55	23.12	+ 3 + 5	4.9	32.44	33.30	-30 + 3
6.0	37.07	12.10	+24 - 2	5.9	44.46	23.49	-11 + 5	5.9	31.71	33.60	-35 0
7.0	37.62	12.45	+20 + 1	6.9	44.36	23.86	-24 + 4	6.9	30.95	33.89	-32 - 4
8.0	38.14	12.81	+11 + 4	7.9	44.23	24.22	-34 + 2	7.9	30.17	34.18	-22 - 6
9.0	38.64	13.17	- 3 + 5	8.9	44.08	24.58	-35 - 2	8.9	29.37	34.46	- 7 - 7
10.0	39.13	13.53	-18 + 5	9.9	43.91	24.95	-28 - 5	9.9	28.56	34.74	+11 - 7
11.0	39.59	13.90	-29 + 4	10.9	43.72	25.31	-15 - 7	10.9	27.72	35.02	+26 - 5
12.0	40.04	14.26	-35 + 1	11.9	43.50	25.67	+ 3 - 7	11.9	26.87	35.29	+35 - 1
13.0	40.47	14.62	-32 - 2	12.9	43.26	26.02	+20 - 6	12.9	26.00	35.55	+37 + 3
14.0	40.88	14.99	-21 - 5	13.9	43.00	26.38	+33 - 2	13.9	25.10	35.81	+30 + 7
15.0	41.27	15.36	- 5 - 6	14.9	42.71	26.73	+38 + 1	14.9	24.19	36.07	+19 + 9
16.0	41.63	15.72	+13 - 6	15.9	42.41	27.09	+36 + 5	15.8	23.27	36.32	+ 5 + 9
17.0	41.98	16.09	+23 - 4	16.9	42.08	27.44	+26 + 8	16.8	22.32	36.57	- 8 + 8
18.0	42.31	16.46	+38 0	17.9	41.73	27.79	+14 +10	17.8	21.36	36.81	-19 + 6
19.0	42.61	16.83	+39 + 3	18.9	41.36	28.13	- 1 + 9	18.8	20.38	37.05	-25 + 3
20.0	42.90	17.20	+32 + 7	19.9	40.96	28.48	-13 + 7	19.8	19.38	37.28	-26 0
21.0	43.16	17.57	+21 + 8	20.9	40.55	28.82	-21 + 5	20.8	18.37	37.51	-23 - 3
21.9	43.41	17.94	+ 7 + 9	21.9	40.11	29.16	-26 + 2	21.8	17.34	37.73	-15 - 6
22.9	43.63	18.31	- 6 + 8	22.9	39.65	29.50	-25 - 1	22.8	16.29	37.95	- 5 - 7
23.9	43.83	18.68	-17 + 6	23.9	39.16	29.83	-19 - 4	23.8	15.23	38.16	+ 6 - 7
24.9	44.00	19.05	-23 + 3	24.9	38.66	30.16	-12 - 6	24.8	14.15	38.37	+15 - 6
25.9	44.16	19.43	-26 0	25.9	38.13	30.49	- 2 - 7	25.8	13.06	38.57	+22 - 4
26.9	44.29	19.80	-24 - 3	26.9	37.59	30.82	+ 9 - 7	26.8	11.95	38.77	+25 - 1
27.9	44.41	20.17	-18 - 5	27.9	37.02	31.14	+18 - 6	27.8	10.83	38.96	+22 + 1
28.9	44.50	20.54	- 9 - 7	28.9	36.43	31.46	+23 - 3	28.8	09.69	39.14	+14 + 4
29.9	44.58	20.91	+ 1 - 8	29.9	35.81	31.77	+24 - 1	29.8	08.54	39.32	+ 2 + 5
30.9	44.63	21.28	+11 - 7	30.9	35.18	32.09	+19 + 2	30.8	07.38	39.49	-12 + 5
31.9	44.65	21.65	+19 - 6	31.9	34.53	32.40	+ 9 + 4	31.8	06.21	39.66	-24 + 4

δ	Sec δ	Tan δ	δ	Sec δ	Tan δ
° ' "			° ' "		
+89 04 10	+61.574	+61.566	+89 04 30	+61.944	+61.936
+89 04 20	+61.759	+61.751	+89 04 40	+62.131	+62.123

Mean Place 1958.0: $\alpha=1^h 54^m 15^s.65$; $\delta=+89^\circ 04' 05''.40$

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1958

Reduce the observed altitude of Polaris to the true altitude.
Reduce the recorded time of observation to the local sidereal time.
Take out the apparent right ascension and declination of Polaris for the time of observation.
Subtract the apparent right ascension from the local sidereal time of observation and the remainder is the hour angle of Polaris.

With this hour angle as the vertical argument, and the apparent declination of Polaris as the horizontal argument, take out the correction from Table I and add it to or subtract it from the true altitude, according to its sign.

For altitudes other than 45°, corrections taken from the supplementary table at the bottom of Table I (Table Ia) may be applied when necessary for the degree of accuracy required.

Example.—August 5, 1958, at 11^h 40^m 30^s P. M. local mean solar time, in longitude 59° west of Greenwich, suppose the true altitude of Polaris to be 33° 20' 00'', required the latitude of the place.

Local civil time	h	m	s
	23	40	30
Reduction from Table III for 23 ^h 40 ^m 30 ^s		+ 3	53
Greenwich sidereal time of 0 ^h civil time, Aug. 5 (page 10)	20	52	09
Reduction from Table III for longitude (=3 ^h 56 ^m west)		+ 0	39
Sum (having regard to signs) is equal to local sidereal time	20	37	11
R. A. of Polaris (page 520) for time of observation	1	55	35
Remainder is equal to hour angle of Polaris	18	41	36
Decl. of Polaris (page 520) for time of observation, 89° 03' 56''			
True altitude	+33	20	00
Correction from Table I		- 9	41
Correction, from Table Ia			-09
Latitude of the place	+33	10	10

Observation of Polaris for latitude should be made when practicable near the times of upper or of lower culminations (hour angle 0^h or 12^h). However, at sea, if made near elongation (hour angle 6^h or 18^h), the hour angle, and hence the local time, should be known within one minute.

Decl.	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	Decl.
H. A.							H. A.
h m	' "	' "	' "	' "	' "	' "	h m
0 00	-56 10 0	-56 00 0	-55 50 0	-55 40 0	-55 30 0	-55 20 0	24 00
03	56 10 1	56 00 1	55 50 1	55 40 1	55 30 1	55 20 1	23 57
06	56 09 2	55 59 2	55 49 2	55 39 2	55 29 2	55 19 2	54
09	56 07 2	55 57 2	55 47 2	55 37 2	55 27 2	55 17 2	51
12	56 05 2	55 55 2	55 45 2	55 35 2	55 25 2	55 15 2	48
0 15	-56 03 4	-55 53 4	-55 43 3	-55 33 3	-55 23 3	-55 13 3	23 45
18	55 59 3	55 49 3	55 40 4	55 30 4	55 20 4	55 10 4	42
21	55 56 5	55 46 5	55 36 5	55 26 5	55 16 5	55 06 5	39
24	55 51 5	55 41 5	55 31 5	55 21 5	55 11 5	55 02 5	36
27	55 46 5	55 36 5	55 26 5	55 16 5	55 07 6	54 57 6	33
0 30	-55 41 6	-55 31 6	-55 21 6	-55 11 6	-55 01 6	-54 51 6	23 30
33	55 35 7	55 25 7	55 15 7	55 05 7	54 55 7	54 45 7	27
36	55 28 7	55 18 7	55 08 7	54 58 7	54 48 7	54 38 7	24
39	55 21 8	55 11 8	55 01 8	54 51 8	54 41 8	54 31 8	21
42	55 13 9	55 03 9	54 53 8	54 43 8	54 33 8	54 24 9	18
0 45	-55 04 9	-54 54 9	-54 45 9	-54 35 9	-54 25 9	-54 15 9	23 15
48	54 55 9	54 45 9	54 36 9	54 26 9	54 16 9	54 06 9	12
51	54 46 9	54 36 9	54 26 10	54 16 10	54 07 10	53 57 10	09
54	54 35 10	54 25 10	54 16 10	54 06 10	53 57 10	53 47 10	06
0 57	54 25 12	54 15 11	54 05 11	53 56 12	53 46 11	53 36 11	03
1 00	-54 13 12	-54 04 12	-53 54 12	-53 44 11	-53 35 12	-53 25 12	23 00
03	54 01 12	53 52 12	53 42 12	53 33 11	53 23 12	53 13 12	22 57
06	53 49 12	53 39 13	53 30 12	53 20 13	53 11 12	53 01 12	54
09	53 36 13	53 26 13	53 17 13	53 07 13	52 58 13	52 48 13	51
1 12	-53 22 14	-53 13 13	-53 03 14	-52 54 13	-52 44 14	-52 35 13	22 48

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1958

Decl. H. A.	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
1 12	-53 22	-53 13	-53 03	-52 54	-52 44	-52 35	22 48
15	53 08	52 59	52 49	52 40	52 31	52 21	45
18	52 54	52 44	52 35	52 25	52 16	52 07	42
21	52 38	52 29	52 20	52 10	52 01	51 52	39
24	52 23	52 13	52 04	51 55	51 45	51 36	36
1 27	-52 06	-51 57	-51 48	-51 39	-51 29	-51 20	22 33
30	51 49	51 40	51 31	51 22	51 13	51 03	30
33	51 32	51 23	51 14	51 05	50 55	50 46	27
36	51 14	51 05	50 56	50 47	50 38	50 29	24
39	50 56	50 47	50 38	50 29	50 19	50 10	21
1 42	-50 37	-50 28	-50 19	-50 10	-50 01	-49 52	22 18
45	50 17	50 08	49 59	49 50	49 41	49 32	15
48	49 57	49 48	49 39	49 30	49 22	49 13	12
51	49 37	49 28	49 19	49 10	49 01	48 52	09
54	49 15	49 07	48 58	48 49	48 40	48 32	06
1 57	-48 54	-48 45	-48 36	-48 28	-48 19	-48 10	22 03
2 00	48 32	48 23	48 14	48 06	47 57	47 49	22 00
03	48 09	48 01	47 52	47 43	47 35	47 26	21 57
06	47 46	47 37	47 29	47 21	47 12	47 04	54
09	47 22	47 14	47 06	46 57	46 49	46 40	51
2 12	-46 58	-46 50	-46 42	-46 33	-46 25	-46 17	21 48
15	46 34	46 25	46 17	46 09	46 01	45 52	45
18	46 09	46 00	45 52	45 44	45 36	45 28	42
21	45 43	45 35	45 27	45 19	45 11	45 02	39
24	45 17	45 09	45 01	44 53	44 45	44 37	36
2 27	-44 50	-44 43	-44 35	-44 27	-44 19	-44 11	21 33
30	44 23	44 16	44 08	44 00	43 52	43 44	30
33	43 56	43 48	43 40	43 33	43 25	43 17	27
36	43 28	43 20	43 13	43 05	42 57	42 50	24
39	43 00	42 52	42 45	42 37	42 29	42 22	21
2 42	-42 31	-42 24	-42 16	-42 08	-42 01	-41 53	21 18
45	42 02	41 54	41 47	41 39	41 32	41 25	15
48	41 32	41 25	41 17	41 10	41 03	40 55	12
51	41 02	40 55	40 48	40 40	40 33	40 26	09
54	40 32	40 24	40 17	40 10	40 03	39 56	06
2 57	-40 01	-39 54	-39 46	-39 39	-39 32	-39 25	21 03
3 00	39 29	39 22	39 15	39 08	39 01	38 54	21 00
03	38 58	38 51	38 44	38 37	38 30	38 23	20 57
06	38 25	38 19	38 12	38 05	37 58	37 51	54
09	37 53	37 46	37 39	37 33	37 26	37 19	51
3 12	-37 20	-37 13	-37 07	-37 00	-36 53	-36 47	20 48
15	36 47	36 40	36 34	36 27	36 21	36 14	45
18	36 13	36 06	36 00	35 54	35 47	35 41	42
21	35 39	35 32	35 26	35 20	35 14	35 07	39
24	35 04	34 58	34 52	34 46	34 40	34 33	36
3 27	-34 29	-34 23	-34 17	-34 11	-34 05	-33 59	20 33
30	33 54	33 48	33 42	33 36	33 30	33 24	30
33	33 19	33 13	33 07	33 01	32 55	32 49	27
36	32 43	32 37	32 31	32 26	32 20	32 14	24
39	32 07	32 01	31 55	31 50	31 44	31 38	21
3 42	-31 30	-31 25	-31 19	-31 14	-31 08	-31 02	20 18
45	30 53	30 48	30 42	30 37	30 32	30 26	15
48	30 16	30 11	30 06	30 00	29 55	29 50	12
51	29 39	29 33	29 28	29 23	29 18	29 13	09
54	29 01	28 56	28 51	28 46	28 40	28 35	06
3 57	-28 23	-28 18	-28 13	-28 08	-28 03	-27 58	20 03
4 00	27 44	27 40	27 35	27 30	27 25	27 20	20 00
03	27 06	27 01	26 56	26 52	26 47	26 42	19 57
06	26 27	26 22	26 18	26 13	26 08	26 04	54
4 09	-25 48	-25 43	-25 39	-25 34	-25 30	-25 25	19 51

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1958

Decl.								Decl.	
H. A.		89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	H. A.	
h m		' "	' "	' "	' "	' "	' "	h m	
4	09	-25 48 ⁴⁰	-25 43 ³⁹	-25 39 ⁴⁰	-25 34 ³⁹	-25 30 ³⁹	-25 25 ³⁹	19	51 ⁴⁸
	12	25 08 ⁴⁰	25 04 ⁴⁰	24 59 ³⁹	24 55 ³⁹	24 51 ⁴⁰	24 46 ³⁹		48
	15	24 28 ⁴⁰	24 24 ⁴⁰	24 20 ³⁹	24 16 ³⁹	24 11 ⁴⁰	24 07 ³⁹		45
	18	23 49 ³⁹	23 44 ⁴⁰	23 40 ⁴⁰	23 36 ⁴⁰	23 32 ⁴⁰	23 28 ³⁹		42
	21	23 08 ⁴⁰	23 04 ⁴⁰	23 00 ⁴⁰	22 56 ⁴⁰	22 52 ⁴⁰	22 48 ⁴⁰		39
4	24	-22 28 ⁴¹	-22 24 ⁴¹	-22 20 ⁴⁰	-22 16 ⁴⁰	-22 12 ⁴⁰	-22 08 ⁴⁰	19	36 ³³
	27	21 47 ⁴¹	21 43 ⁴¹	21 40 ⁴¹	21 36 ⁴¹	21 32 ⁴¹	21 28 ⁴⁰		33
	30	21 06 ⁴¹	21 03 ⁴¹	20 59 ⁴¹	20 55 ⁴¹	20 51 ⁴¹	20 48 ⁴¹		30
	33	20 25 ⁴¹	20 22 ⁴²	20 18 ⁴¹	20 14 ⁴¹	20 11 ⁴¹	20 07 ⁴¹		27
	36	19 44 ⁴²	19 40 ⁴¹	19 37 ⁴¹	19 33 ⁴¹	19 30 ⁴¹	19 27 ⁴¹		24
4	39	-19 02 ⁴¹	-18 59 ⁴²	-18 56 ⁴²	-18 52 ⁴¹	-18 49 ⁴¹	-18 46 ⁴¹	19	21 ¹⁸
	42	18 21 ⁴²	18 17 ⁴¹	18 14 ⁴¹	18 11 ⁴²	18 08 ⁴²	18 05 ⁴²		18
	45	17 39 ⁴²	17 36 ⁴²	17 33 ⁴²	17 29 ⁴¹	17 26 ⁴¹	17 23 ⁴¹		15
	48	16 57 ⁴²	16 54 ⁴²	16 51 ⁴²	16 48 ⁴¹	16 45 ⁴¹	16 42 ⁴¹		12
	51	16 14 ⁴³	16 12 ⁴²	16 09 ⁴²	16 06 ⁴²	16 03 ⁴²	16 00 ⁴²		09
4	54	-15 32 ⁴³	-15 29 ⁴²	-15 27 ⁴³	-15 24 ⁴²	-15 21 ⁴²	-15 18 ⁴¹	19	06 ⁰³
	57	14 49 ⁴²	14 47 ⁴³	14 44 ⁴²	14 42 ⁴³	14 39 ⁴²	14 37 ⁴¹		03
	5	14 07 ⁴³	14 04 ⁴³	14 02 ⁴³	13 59 ⁴²	13 57 ⁴²	13 54 ⁴²		00
	03	13 24 ⁴³	13 21 ⁴²	13 19 ⁴³	13 17 ⁴²	13 15 ⁴³	13 12 ⁴²		57
	06	12 41 ⁴³	12 39 ⁴³	12 36 ⁴²	12 34 ⁴³	12 32 ⁴³	12 30 ⁴²		54
5	09	-11 58 ⁴⁴	-11 56 ⁴⁴	-11 54 ⁴³	-11 51 ⁴²	-11 49 ⁴²	-11 47 ⁴²	18	51 ⁴⁸
	12	11 14 ⁴³	11 12 ⁴³	11 11 ⁴⁴	11 09 ⁴³	11 07 ⁴³	11 05 ⁴³		48
	15	10 31 ⁴³	10 29 ⁴³	10 27 ⁴⁴	10 26 ⁴³	10 24 ⁴³	10 22 ⁴³		45
	18	9 48 ⁴³	9 46 ⁴⁴	9 44 ⁴³	9 43 ⁴³	9 41 ⁴³	9 39 ⁴³		42
	21	9 04 ⁴⁴	9 02 ⁴³	9 01 ⁴³	8 59 ⁴³	8 58 ⁴³	8 56 ⁴³		39
5	24	- 8 20 ⁴³	- 8 19 ⁴⁴	- 8 18 ⁴⁴	- 8 16 ⁴³	- 8 15 ⁴³	- 8 13 ⁴³	18	36 ³³
	27	7 37 ⁴⁴	7 35 ⁴³	7 34 ⁴³	7 33 ⁴⁴	7 32 ⁴⁴	7 30 ⁴³		33
	30	6 53 ⁴⁴	6 52 ⁴⁴	6 51 ⁴⁴	6 49 ⁴⁴	6 48 ⁴⁴	6 47 ⁴³		30
	33	6 09 ⁴⁴	6 08 ⁴⁴	6 07 ⁴⁴	6 06 ⁴³	6 05 ⁴³	6 04 ⁴³		27
	36	5 25 ⁴⁴	5 24 ⁴⁴	5 23 ⁴³	5 22 ⁴³	5 22 ⁴⁴	5 21 ⁴⁴		24
5	39	- 4 41 ⁴⁴	- 4 40 ⁴⁴	- 4 40 ⁴⁴	- 4 39 ⁴⁴	- 4 38 ⁴⁴	- 4 37 ⁴³	18	21 ¹⁸
	42	3 57 ⁴⁴	3 56 ⁴³	3 56 ⁴⁴	3 55 ⁴³	3 55 ⁴⁴	3 54 ⁴³		18
	45	3 13 ⁴⁴	3 13 ⁴⁴	3 12 ⁴⁴	3 12 ⁴³	3 11 ⁴⁴	3 11 ⁴³		15
	48	2 29 ⁴⁴	2 29 ⁴⁴	2 28 ⁴⁴	2 28 ⁴⁴	2 27 ⁴³	2 27 ⁴⁴		12
	51	1 45 ⁴⁴	1 45 ⁴⁴	1 44 ⁴³	1 44 ⁴⁴	1 44 ⁴⁴	1 44 ⁴³		09
5	54	- 1 01 ⁴⁴	- 1 01 ⁴⁴	- 1 01 ⁴⁴	- 1 00 ⁴³	- 1 00 ⁴³	- 1 00 ⁴³	18	06 ⁰³
	57	- 0 17 ⁴⁴	- 0 17 ⁴⁴	- 0 17 ⁴⁴	- 0 17 ⁴³	- 0 17 ⁴³	- 0 17 ⁴³		03
	6	+ 0 28 ⁴⁵	+ 0 27 ⁴⁴	+ 0 27 ⁴⁴	+ 0 27 ⁴⁴	+ 0 27 ⁴⁴	+ 0 27 ⁴⁴		00
	03	1 12 ⁴⁴	1 11 ⁴⁴	1 11 ⁴⁴	1 11 ⁴³	1 10 ⁴³	1 10 ⁴⁴		57
	06	1 56 ⁴⁴	1 55 ⁴⁴	1 55 ⁴⁴	1 54 ⁴³	1 54 ⁴⁴	1 54 ⁴³		54
6	09	+ 2 40 ⁴⁴	+ 2 39 ⁴⁴	+ 2 39 ⁴³	+ 2 38 ⁴⁴	+ 2 38 ⁴³	+ 2 37 ⁴³	17	51 ⁴⁸
	12	3 24 ⁴⁴	3 23 ⁴⁴	3 22 ⁴⁴	3 22 ⁴³	3 21 ⁴³	3 20 ⁴³		48
	15	4 08 ⁴⁴	4 07 ⁴⁴	4 06 ⁴⁴	4 05 ⁴³	4 05 ⁴⁴	4 04 ⁴⁴		45
	18	4 52 ⁴⁴	4 51 ⁴⁴	4 50 ⁴⁴	4 49 ⁴³	4 48 ⁴³	4 47 ⁴³		42
	21	5 36 ⁴⁴	5 35 ⁴³	5 34 ⁴³	5 32 ⁴⁴	5 31 ⁴⁴	5 30 ⁴³		39
6	24	+ 6 20 ⁴³	+ 6 18 ⁴⁴	+ 6 17 ⁴⁴	+ 6 16 ⁴³	+ 6 15 ⁴³	+ 6 13 ⁴⁴	17	36 ³³
	27	7 03 ⁴⁴	7 02 ⁴⁴	7 01 ⁴³	6 59 ⁴⁴	6 58 ⁴³	6 57 ⁴³		33
	30	7 47 ⁴⁴	7 46 ⁴³	7 44 ⁴³	7 43 ⁴³	7 41 ⁴³	7 40 ⁴³		30
	33	8 31 ⁴⁴	8 29 ⁴³	8 27 ⁴³	8 26 ⁴³	8 24 ⁴³	8 23 ⁴³		27
	36	9 14 ⁴³	9 12 ⁴⁴	9 11 ⁴³	9 09 ⁴³	9 07 ⁴³	9 05 ⁴²		24
6	39	+ 9 57 ⁴⁴	+ 9 56 ⁴³	+ 9 54 ⁴³	+ 9 52 ⁴³	+ 9 50 ⁴³	+ 9 48 ⁴³	17	21 ¹⁸
	42	10 41 ⁴³	10 39 ⁴³	10 37 ⁴³	10 35 ⁴³	10 33 ⁴³	10 31 ⁴³		18
	45	11 24 ⁴³	11 22 ⁴³	11 20 ⁴³	11 18 ⁴²	11 16 ⁴²	11 13 ⁴³		15
	48	12 07 ⁴³	12 05 ⁴³	12 03 ⁴²	12 00 ⁴²	11 58 ⁴²	11 56 ⁴²		12
	51	12 50 ⁴³	12 48 ⁴²	12 45 ⁴³	12 43 ⁴²	12 41 ⁴²	12 38 ⁴²		09
6	54	+13 33 ⁴²	+13 30 ⁴³	+13 28 ⁴²	+13 25 ⁴³	+13 23 ⁴²	+13 20 ⁴²	17	06 ⁰³
	57	14 15 ⁴³	14 13 ⁴²	14 10 ⁴²	14 08 ⁴²	14 05 ⁴²	14 02 ⁴²		03
	7	14 58 ⁴²	14 55 ⁴²	14 52 ⁴³	14 50 ⁴²	14 47 ⁴²	14 44 ⁴²		00
	03	15 40 ⁴²	15 37 ⁴²	15 35 ⁴³	15 32 ⁴²	15 29 ⁴²	15 26 ⁴²		57
	7	+16 23 ⁴³	+16 20 ⁴³	+16 17 ⁴²	+16 14 ⁴²	+16 11 ⁴²	+16 08 ⁴²		54

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1958

Decl. H. A.	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
7 06	+16 23	+16 20	+16 17	+16 14	+16 11	+16 08	16 54
09	17 05 ⁴²	17 01 ⁴¹	16 58 ⁴²	16 55 ⁴²	16 52 ⁴¹	16 49 ⁴¹	51
12	17 46 ⁴¹	17 43 ⁴²	17 40 ⁴²	17 37 ⁴²	17 33 ⁴¹	17 30 ⁴¹	48
15	18 28 ⁴²	18 25 ⁴¹	18 21 ⁴¹	18 18 ⁴¹	18 15 ⁴²	18 11 ⁴¹	45
18	19 09 ⁴¹	19 06 ⁴¹	19 03 ⁴¹	18 59 ⁴¹	18 56 ⁴⁰	18 52 ⁴¹	42
7 21	+19 51	+19 47	+19 44	+19 40	+19 36	+19 33	16 39
24	20 32 ⁴¹	20 28 ⁴¹	20 24 ⁴⁰	20 21 ⁴¹	20 17 ⁴¹	20 13 ⁴⁰	36
27	21 13 ⁴¹	21 09 ⁴¹	21 05 ⁴¹	21 01 ⁴⁰	20 57 ⁴⁰	20 53 ⁴⁰	33
30	21 53 ⁴⁰	21 49 ⁴⁰	21 45 ⁴⁰	21 41 ⁴⁰	21 37 ⁴⁰	21 33 ⁴⁰	30
33	22 34 ⁴¹	22 30 ⁴⁰	22 25 ⁴⁰	22 21 ⁴⁰	22 17 ⁴⁰	22 13 ⁴⁰	27
7 36	+23 14	+23 10	+23 05	+23 01	+22 57	+22 53	16 24
39	23 54 ⁴⁰	23 49 ³⁹	23 45 ⁴⁰	23 41 ⁴⁰	23 36 ³⁹	23 32 ³⁹	21
42	24 33 ³⁹	24 29 ⁴⁰	24 24 ³⁹	24 20 ³⁹	24 16 ⁴⁰	24 11 ³⁹	18
45	25 13 ⁴⁰	25 08 ³⁹	25 04 ³⁹	24 59 ³⁹	24 55 ³⁸	24 50 ³⁹	15
48	25 52 ³⁹	25 47 ³⁹	25 43 ³⁸	25 38 ³⁸	25 33 ³⁹	25 29 ³⁸	12
7 51	+26 31	+26 26	+26 21	+26 16	+26 12	+26 07	16 09
54	27 09 ³⁸	27 04 ³⁸	27 00 ³⁹	26 55 ³⁹	26 50 ³⁸	26 45 ³⁸	06
7 57	27 48 ³⁹	27 43 ³⁸	27 38 ³⁸	27 33 ³⁸	27 28 ³⁸	27 23 ³⁸	03
8 00	28 26 ³⁸	28 21 ³⁸	28 16 ³⁸	28 10 ³⁷	28 05 ³⁷	28 00 ³⁷	16 00
03	29 03 ³⁷	28 58 ³⁷	28 53 ³⁷	28 48 ³⁸	28 43 ³⁸	28 37 ³⁷	15 57
8 06	+29 41	+29 36	+29 30	+29 25	+29 20	+29 14	15 54
09	30 18 ³⁷	30 13 ³⁷	30 07 ³⁷	30 02 ³⁶	29 56 ³⁶	29 51 ³⁷	51
12	30 55 ³⁷	30 49 ³⁶	30 44 ³⁶	30 38 ³⁶	30 33 ³⁷	30 27 ³⁶	48
15	31 31 ³⁶	31 26 ³⁷	31 20 ³⁶	31 14 ³⁶	31 09 ³⁶	31 03 ³⁶	45
18	32 08 ³⁷	32 02 ³⁶	31 56 ³⁶	31 50 ³⁶	31 45 ³⁵	31 39 ³⁶	42
8 21	+32 43	+32 38	+32 32	+32 26	+32 20	+32 14	15 39
24	33 19 ³⁶	33 13 ³⁵	33 07 ³⁵	33 01 ³⁵	32 55 ³⁵	32 49 ³⁵	36
27	33 54 ³⁵	33 48 ³⁵	33 42 ³⁵	33 36 ³⁴	33 30 ³⁵	33 24 ³⁵	33
30	34 29 ³⁴	34 23 ³⁴	34 17 ³⁴	34 10 ³⁵	34 04 ³⁴	33 58 ³⁴	30
33	35 03 ³⁵	34 57 ³⁴	34 51 ³⁴	34 45 ³³	34 38 ³⁴	34 32 ³⁴	27
8 36	+35 38	+35 31	+35 25	+35 18	+35 12	+35 06	15 24
39	36 11 ³³	36 05 ³³	35 58 ³³	35 52 ³³	35 45 ³³	35 39 ³³	21
42	36 45 ³⁴	36 38 ³³	36 31 ³³	36 25 ³³	36 18 ³³	36 12 ³³	18
45	37 18 ³³	37 11 ³³	37 04 ³³	36 58 ³³	36 51 ³²	36 44 ³²	15
48	37 50 ³²	37 43 ³³	37 37 ³²	37 30 ³²	37 23 ³²	37 16 ³²	12
8 51	+38 23	+38 16	+38 09	+38 02	+37 55	+37 48	15 09
54	38 54 ³¹	38 47 ³¹	38 40 ³¹	38 33 ³¹	38 26 ³¹	38 19 ³¹	06
8 57	39 26 ³²	39 19 ³²	39 12 ³²	39 05 ³²	38 58 ³²	38 50 ³¹	03
9 00	39 57 ³¹	39 50 ³¹	39 43 ³⁰	39 35 ³⁰	39 28 ³⁰	39 21 ³⁰	15 00
03	40 27 ³⁰	40 20 ³⁰	40 13 ³⁰	40 06 ³⁰	39 58 ³⁰	39 51 ³⁰	14 57
9 06	+40 58	+40 50	+40 43	+40 36	+40 28	+40 21	14 54
09	41 27 ²⁹	41 20 ³⁰	41 13 ³⁰	41 05 ²⁹	40 58 ³⁰	40 50 ²⁹	51
12	41 57 ³⁰	41 49 ²⁹	41 42 ²⁹	41 34 ²⁹	41 27 ²⁹	41 19 ²⁹	48
15	42 26 ²⁹	42 18 ²⁹	42 11 ²⁹	42 03 ²⁸	41 55 ²⁸	41 48 ²⁸	45
18	42 54 ²⁸	42 47 ²⁸	42 39 ²⁸	42 31 ²⁸	42 24 ²⁷	42 16 ²⁸	42
9 21	+43 22	+43 15	+43 07	+42 59	+42 51	+42 44	14 39
24	43 50 ²⁸	43 42 ²⁷	43 34 ²⁷	43 26 ²⁷	43 19 ²⁸	43 11 ²⁷	36
27	44 17 ²⁷	44 09 ²⁷	44 01 ²⁷	43 53 ²⁷	43 45 ²⁶	43 38 ²⁶	33
30	44 44 ²⁶	44 36 ²⁶	44 28 ²⁶	44 20 ²⁶	44 12 ²⁷	44 04 ²⁶	30
33	45 10 ²⁶	45 02 ²⁶	44 54 ²⁶	44 46 ²⁶	44 38 ²⁵	44 30 ²⁵	27
9 36	+45 36	+45 28	+45 20	+45 12	+45 03	+44 55	14 24
39	46 01 ²⁵	45 53 ²⁵	45 45 ²⁵	45 37 ²⁵	45 28 ²⁵	45 20 ²⁵	21
42	46 26 ²⁵	46 18 ²⁴	46 10 ²⁴	46 01 ²⁵	45 53 ²⁴	45 45 ²⁴	18
45	46 51 ²⁴	46 42 ²⁴	46 34 ²⁴	46 26 ²⁴	46 17 ²⁴	46 09 ²⁴	15
48	47 15 ²³	47 06 ²⁴	46 58 ²³	46 49 ²³	46 41 ²³	46 32 ²³	12
9 51	+47 38	+47 30	+47 21	+47 12	+47 04	+46 55	14 09
54	48 01 ²³	47 52 ²²	47 44 ²²	47 35 ²³	47 27 ²²	47 18 ²²	06
9 57	48 23 ²²	48 15 ²²	48 06 ²²	47 58 ²¹	47 49 ²²	47 40 ²²	03
10 00	48 45 ²²	48 37 ²¹	48 28 ²¹	48 19 ²¹	48 11 ²²	48 02 ²²	14 00
10 03	+49 07	+48 58	+48 49	+48 41	+48 32	+48 23	13 57

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1958

Decl.		89° 03' 50''		89° 04' 00''		89° 04' 10''		89° 04' 20''		89° 04' 30''		89° 04' 40''		Decl.	
H. A.														H. A.	
h m		' "		' "		' "		' "		' "		' "		h m	
10	03	+49	07	+48	58	+48	49	+48	41	+48	32	+48	23	13	57
	06	49	28	49	19	49	10	49	01	48	53	48	44		54
	09	49	48	49	40	49	31	49	22	49	13	49	04		51
	12	50	08	49	59	49	51	49	42	49	33	49	24		48
	15	50	28	50	19	50	10	50	01	49	52	49	43		45
			19		19		19		19		19		19		
10	18	+50	47	+50	38	+50	29	+50	20	+50	11	+50	02	13	42
	21	51	05	50	56	50	47	50	38	50	29	50	20		39
	24	51	23	51	14	51	05	50	56	50	47	50	37		36
	27	51	41	51	31	51	22	51	13	51	04	50	55		33
	30	51	58	51	48	51	39	51	30	51	20	51	11		30
			16		17		16		16		17		16		
10	33	+52	14	+52	05	+51	55	+51	46	+51	37	+51	27	13	27
	36	52	30	52	20	52	11	52	02	51	52	51	43		24
	39	52	45	52	36	52	26	52	17	52	07	51	58		21
	42	53	00	52	50	52	41	52	31	52	22	52	13		18
	45	53	14	53	05	52	55	52	46	52	36	52	27		15
			14		13		14		13		14		13		
10	48	+53	28	+53	18	+53	09	+52	59	+52	50	+52	40	13	12
	51	53	41	53	31	53	22	53	12	53	03	52	53		09
	54	53	53	53	44	53	34	53	25	53	15	53	05		06
10	57	54	06	53	56	53	46	53	37	53	27	53	17		03
11	00	54	17	54	07	53	58	53	48	53	38	53	29	13	00
			11		11		11		11		11		10		
11	03	+54	28	+54	18	+54	09	+53	59	+53	49	+53	39	12	57
	06	54	38	54	29	54	19	54	09	53	59	53	50		54
	09	54	48	54	38	54	29	54	19	54	09	53	59		51
	12	54	58	54	48	54	38	54	28	54	18	54	09		48
	15	55	06	54	56	54	47	54	37	54	27	54	17		45
			8		9		8		8		8		8		
11	18	+55	14	+55	05	+54	55	+54	45	+54	35	+54	25	12	42
	21	55	22	55	12	55	02	54	53	54	43	54	33		39
	24	55	29	55	19	55	09	55	00	54	50	54	40		36
	27	55	36	55	26	55	16	55	06	54	56	54	46		33
	30	55	42	55	32	55	22	55	12	55	02	54	52		30
			5		5		5		5		5		5		
11	33	+55	47	+55	37	+55	27	+55	17	+55	07	+54	57	12	27
	36	55	52	55	42	55	32	55	22	55	12	55	02		24
	39	55	56	55	46	55	36	55	26	55	16	55	06		21
	42	56	00	55	50	55	40	55	30	55	20	55	10		18
	45	56	03	55	53	55	43	55	33	55	23	55	13		15
			2		2		2		2		3		3		
11	48	+56	05	+55	55	+55	45	+55	35	+55	26	+55	16	12	12
	51	56	07	55	57	55	47	55	37	55	27	55	17		09
	54	56	09	55	59	55	49	55	39	55	29	55	19		06
11	57	56	10	56	00	55	50	55	40	55	30	55	20		03
12	00	+56	10	+56	00	+55	50	+55	40	+55	30	+55	20		00
			0		0		0		0		0		0		

TABLE Ia

Table I has been computed for an altitude of 45°. For other altitudes, corrections taken from the following table may be applied when the desired degree of accuracy requires it.

Altitude		10°		20°		30°		40°		50°		60°		70°		Altitude	
H. A.																H. A.	
h		h		"		"		"		"		"		"		h	
0	12		0		0		0		0		0		0		0	12	24
1	11	-	2	-	1	-	1	-	0	-	0	+	1	+	3	13	23
2	10		6		4		3	-	1	+	1		5		12	14	22
3	9		11		9		6		2		3		10		24	15	21
4	8		17		13		9		3		4		15		36	16	20
5	7		21		16		11		4		5		19		45	17	19
6	6	-	23	-	17	-	12	-	4	+	5	+	20	+	48	18	18

SIDEREAL INTO MEAN SOLAR TIME

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL

Sidereal	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	For Seconds	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	0 0.000	0 9.830	0 19.659	0 29.489	0 39.318	0 49.148	0 58.977	1 8.807	0	0.000
1	0 0.164	0 9.993	0 19.823	0 29.653	0 39.482	0 49.312	0 59.141	1 8.971	1	0.003
2	0 0.328	0 10.157	0 19.987	0 29.816	0 39.646	0 49.475	0 59.305	1 9.135	2	0.005
3	0 0.491	0 10.321	0 20.151	0 29.980	0 39.810	0 49.639	0 59.469	1 9.298	3	0.008
4	0 0.655	0 10.485	0 20.314	0 30.144	0 39.974	0 49.803	0 59.633	1 9.462	4	0.011
5	0 0.819	0 10.649	0 20.478	0 30.308	0 40.137	0 49.967	0 59.796	1 9.626	5	0.014
6	0 0.983	0 10.813	0 20.642	0 30.472	0 40.301	0 50.131	0 59.960	1 9.790	6	0.016
7	0 1.147	0 10.976	0 20.806	0 30.635	0 40.465	0 50.295	1 0.124	1 9.954	7	0.019
8	0 1.311	0 11.140	0 20.970	0 30.799	0 40.629	0 50.458	1 0.288	1 10.118	8	0.022
9	0 1.474	0 11.304	0 21.134	0 30.963	0 40.793	0 50.622	1 0.452	1 10.281	9	0.025
10	0 1.638	0 11.468	0 21.297	0 31.127	0 40.956	0 50.786	1 0.616	1 10.445	10	0.027
11	0 1.802	0 11.632	0 21.461	0 31.291	0 41.120	0 50.950	1 0.779	1 10.609	11	0.030
12	0 1.966	0 11.795	0 21.625	0 31.455	0 41.284	0 51.114	1 0.943	1 10.773	12	0.033
13	0 2.130	0 11.959	0 21.789	0 31.618	0 41.448	0 51.278	1 1.107	1 10.937	13	0.035
14	0 2.294	0 12.123	0 21.953	0 31.782	0 41.612	0 51.441	1 1.271	1 11.100	14	0.038
15	0 2.457	0 12.287	0 22.117	0 31.946	0 41.776	0 51.605	1 1.435	1 11.264	15	0.041
16	0 2.621	0 12.451	0 22.280	0 32.110	0 41.939	0 51.769	1 1.599	1 11.428	16	0.044
17	0 2.785	0 12.615	0 22.444	0 32.274	0 42.103	0 51.933	1 1.762	1 11.592	17	0.046
18	0 2.949	0 12.778	0 22.608	0 32.438	0 42.267	0 52.097	1 1.926	1 11.756	18	0.049
19	0 3.113	0 12.942	0 22.772	0 32.601	0 42.431	0 52.260	1 2.090	1 11.920	19	0.052
20	0 3.277	0 13.106	0 22.936	0 32.765	0 42.595	0 52.424	1 2.254	1 12.083	20	0.055
21	0 3.440	0 13.270	0 23.099	0 32.929	0 42.759	0 52.588	1 2.418	1 12.247	21	0.057
22	0 3.604	0 13.434	0 23.263	0 33.093	0 42.922	0 52.752	1 2.582	1 12.411	22	0.060
23	0 3.768	0 13.598	0 23.427	0 33.257	0 43.086	0 52.916	1 2.745	1 12.575	23	0.063
24	0 3.932	0 13.761	0 23.591	0 33.420	0 43.250	0 53.080	1 2.909	1 12.739	24	0.066
25	0 4.096	0 13.925	0 23.755	0 33.584	0 43.414	0 53.243	1 3.073	1 12.903	25	0.068
26	0 4.259	0 14.089	0 23.919	0 33.748	0 43.578	0 53.407	1 3.237	1 13.066	26	0.071
27	0 4.423	0 14.253	0 24.082	0 33.912	0 43.742	0 53.571	1 3.401	1 13.230	27	0.074
28	0 4.587	0 14.417	0 24.246	0 34.076	0 43.905	0 53.735	1 3.564	1 13.394	28	0.076
29	0 4.751	0 14.581	0 24.410	0 34.240	0 44.069	0 53.899	1 3.728	1 13.558	29	0.079
30	0 4.915	0 14.744	0 24.574	0 34.403	0 44.233	0 54.063	1 3.892	1 13.722	30	0.082
31	0 5.079	0 14.908	0 24.738	0 34.567	0 44.397	0 54.226	1 4.056	1 13.886	31	0.085
32	0 5.242	0 15.072	0 24.902	0 34.731	0 44.561	0 54.390	1 4.220	1 14.049	32	0.087
33	0 5.406	0 15.236	0 25.065	0 34.895	0 44.724	0 54.554	1 4.384	1 14.213	33	0.090
34	0 5.570	0 15.400	0 25.229	0 35.059	0 44.888	0 54.718	1 4.547	1 14.377	34	0.093
35	0 5.734	0 15.563	0 25.393	0 35.223	0 45.052	0 54.882	1 4.711	1 14.541	35	0.096
36	0 5.898	0 15.727	0 25.557	0 35.386	0 45.216	0 55.046	1 4.875	1 14.705	36	0.098
37	0 6.062	0 15.891	0 25.721	0 35.550	0 45.380	0 55.209	1 5.039	1 14.868	37	0.101
38	0 6.225	0 16.055	0 25.885	0 35.714	0 45.544	0 55.373	1 5.203	1 15.032	38	0.104
39	0 6.389	0 16.219	0 26.048	0 35.878	0 45.707	0 55.537	1 5.367	1 15.196	39	0.106
40	0 6.553	0 16.383	0 26.212	0 36.042	0 45.871	0 55.701	1 5.530	1 15.360	40	0.109
41	0 6.717	0 16.546	0 26.376	0 36.206	0 46.035	0 55.865	1 5.694	1 15.524	41	0.112
42	0 6.881	0 16.710	0 26.540	0 36.369	0 46.199	0 56.028	1 5.858	1 15.688	42	0.115
43	0 7.045	0 16.874	0 26.704	0 36.533	0 46.363	0 56.192	1 6.022	1 15.851	43	0.117
44	0 7.208	0 17.038	0 26.867	0 36.697	0 46.527	0 56.356	1 6.186	1 16.015	44	0.120
45	0 7.372	0 17.202	0 27.031	0 36.861	0 46.690	0 56.520	1 6.350	1 16.179	45	0.123
46	0 7.536	0 17.366	0 27.195	0 37.025	0 46.854	0 56.684	1 6.513	1 16.343	46	0.126
47	0 7.700	0 17.529	0 27.359	0 37.188	0 47.018	0 56.848	1 6.677	1 16.507	47	0.128
48	0 7.864	0 17.693	0 27.523	0 37.352	0 47.182	0 57.011	1 6.841	1 16.671	48	0.131
49	0 8.027	0 17.857	0 27.687	0 37.516	0 47.346	0 57.175	1 7.005	1 16.834	49	0.134
50	0 8.191	0 18.021	0 27.850	0 37.680	0 47.510	0 57.339	1 7.169	1 16.998	50	0.137
51	0 8.355	0 18.185	0 28.014	0 37.844	0 47.673	0 57.503	1 7.332	1 17.162	51	0.139
52	0 8.519	0 18.349	0 28.178	0 38.008	0 47.837	0 57.667	1 7.496	1 17.326	52	0.142
53	0 8.683	0 18.512	0 28.342	0 38.171	0 48.001	0 57.831	1 7.660	1 17.490	53	0.145
54	0 8.847	0 18.676	0 28.506	0 38.335	0 48.165	0 57.994	1 7.824	1 17.654	54	0.147
55	0 9.010	0 18.840	0 28.670	0 38.499	0 48.329	0 58.158	1 7.988	1 17.817	55	0.150
56	0 9.174	0 19.004	0 28.833	0 38.663	0 48.492	0 58.322	1 8.152	1 17.981	56	0.153
57	0 9.338	0 19.168	0 28.997	0 38.827	0 48.656	0 58.486	1 8.315	1 18.145	57	0.156
58	0 9.502	0 19.331	0 29.161	0 38.991	0 48.820	0 58.650	1 8.479	1 18.309	58	0.158
59	0 9.666	0 19.495	0 29.325	0 39.154	0 48.984	0 58.814	1 8.643	1 18.473	59	0.161

SIDEREAL INTO MEAN SOLAR TIME
TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL

Sidereal	8 ^h		9 ^h		10 ^h		11 ^h		12 ^h		13 ^h		14 ^h		15 ^h		For Seconds	
m	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	s	s
0	1	18.636	1	28.466	1	38.296	1	48.125	1	57.955	2	7.784	2	17.614	2	27.443	0	0.000
1	1	18.800	1	28.630	1	38.459	1	48.289	1	58.119	2	7.948	2	17.778	2	27.607	1	0.003
2	1	18.964	1	28.794	1	38.623	1	48.453	1	58.282	2	8.112	2	17.941	2	27.771	2	0.005
3	1	19.128	1	28.958	1	38.787	1	48.617	1	58.446	2	8.276	2	18.105	2	27.935	3	0.008
4	1	19.292	1	29.121	1	38.951	1	48.780	1	58.610	2	8.440	2	18.269	2	28.099	4	0.011
5	1	19.456	1	29.285	1	39.115	1	48.944	1	58.774	2	8.603	2	18.433	2	28.263	5	0.014
6	1	19.619	1	29.449	1	39.279	1	49.108	1	58.938	2	8.767	2	18.597	2	28.426	6	0.016
7	1	19.783	1	29.613	1	39.442	1	49.272	1	59.101	2	8.931	2	18.761	2	28.590	7	0.019
8	1	19.947	1	29.777	1	39.606	1	49.436	1	59.265	2	9.095	2	18.924	2	28.754	8	0.022
9	1	20.111	1	29.940	1	39.770	1	49.600	1	59.429	2	9.259	2	19.088	2	28.918	9	0.025
10	1	20.275	1	30.104	1	39.934	1	49.763	1	59.593	2	9.423	2	19.252	2	29.082	10	0.027
11	1	20.439	1	30.268	1	40.098	1	49.927	1	59.757	2	9.586	2	19.416	2	29.245	11	0.030
12	1	20.602	1	30.432	1	40.261	1	50.091	1	59.921	2	9.750	2	19.580	2	29.409	12	0.033
13	1	20.766	1	30.596	1	40.425	1	50.255	2	0.084	2	9.914	2	19.744	2	29.573	13	0.035
14	1	20.930	1	30.760	1	40.589	1	50.419	2	0.248	2	10.078	2	19.907	2	29.737	14	0.038
15	1	21.094	1	30.923	1	40.753	1	50.583	2	0.412	2	10.242	2	20.071	2	29.901	15	0.041
16	1	21.258	1	31.087	1	40.917	1	50.746	2	0.576	2	10.405	2	20.235	2	30.065	16	0.044
17	1	21.422	1	31.251	1	41.081	1	50.910	2	0.740	2	10.569	2	20.399	2	30.228	17	0.046
18	1	21.585	1	31.415	1	41.244	1	51.074	2	0.904	2	10.733	2	20.563	2	30.392	18	0.049
19	1	21.749	1	31.579	1	41.408	1	51.238	2	1.067	2	10.897	2	20.727	2	30.556	19	0.052
20	1	21.913	1	31.743	1	41.572	1	51.402	2	1.231	2	11.061	2	20.890	2	30.720	20	0.055
21	1	22.077	1	31.906	1	41.736	1	51.565	2	1.395	2	11.225	2	21.054	2	30.884	21	0.057
22	1	22.241	1	32.070	1	41.900	1	51.729	2	1.559	2	11.388	2	21.218	2	31.048	22	0.060
23	1	22.404	1	32.234	1	42.064	1	51.893	2	1.723	2	11.552	2	21.382	2	31.211	23	0.063
24	1	22.568	1	32.398	1	42.227	1	52.057	2	1.887	2	11.716	2	21.546	2	31.375	24	0.066
25	1	22.732	1	32.562	1	42.391	1	52.221	2	2.050	2	11.880	2	21.709	2	31.539	25	0.068
26	1	22.896	1	32.726	1	42.555	1	52.385	2	2.214	2	12.044	2	21.873	2	31.703	26	0.071
27	1	23.060	1	32.889	1	42.719	1	52.548	2	2.378	2	12.208	2	22.037	2	31.867	27	0.074
28	1	23.224	1	33.053	1	42.883	1	52.712	2	2.542	2	12.371	2	22.201	2	32.031	28	0.076
29	1	23.387	1	33.217	1	43.047	1	52.876	2	2.706	2	12.535	2	22.365	2	32.194	29	0.079
30	1	23.551	1	33.381	1	43.210	1	53.040	2	2.869	2	12.699	2	22.529	2	32.358	30	0.082
31	1	23.715	1	33.545	1	43.374	1	53.204	2	3.033	2	12.863	2	22.692	2	32.522	31	0.085
32	1	23.879	1	33.708	1	43.538	1	53.368	2	3.197	2	13.027	2	22.856	2	32.686	32	0.087
33	1	24.043	1	33.872	1	43.702	1	53.531	2	3.361	2	13.191	2	23.020	2	32.850	33	0.090
34	1	24.207	1	34.036	1	43.866	1	53.695	2	3.525	2	13.354	2	23.184	2	33.013	34	0.093
35	1	24.370	1	34.200	1	44.029	1	53.859	2	3.689	2	13.518	2	23.348	2	33.177	35	0.096
36	1	24.534	1	34.364	1	44.193	1	54.023	2	3.852	2	13.682	2	23.512	2	33.341	36	0.098
37	1	24.698	1	34.528	1	44.357	1	54.187	2	4.016	2	13.846	2	23.675	2	33.505	37	0.101
38	1	24.862	1	34.691	1	44.521	1	54.351	2	4.180	2	14.010	2	23.839	2	33.669	38	0.104
39	1	25.026	1	34.855	1	44.685	1	54.514	2	4.344	2	14.173	2	24.003	2	33.833	39	0.106
40	1	25.190	1	35.019	1	44.849	1	54.678	2	4.508	2	14.337	2	24.167	2	33.996	40	0.109
41	1	25.353	1	35.183	1	45.012	1	54.842	2	4.672	2	14.501	2	24.331	2	34.160	41	0.112
42	1	25.517	1	35.347	1	45.176	1	55.006	2	4.835	2	14.665	2	24.495	2	34.324	42	0.115
43	1	25.681	1	35.511	1	45.340	1	55.170	2	4.999	2	14.829	2	24.658	2	34.488	43	0.117
44	1	25.845	1	35.674	1	45.504	1	55.333	2	5.163	2	14.993	2	24.822	2	34.652	44	0.120
45	1	26.009	1	35.838	1	45.668	1	55.497	2	5.327	2	15.156	2	24.986	2	34.816	45	0.123
46	1	26.172	1	36.002	1	45.832	1	55.661	2	5.491	2	15.320	2	25.150	2	34.979	46	0.126
47	1	26.336	1	36.166	1	45.995	1	55.825	2	5.655	2	15.484	2	25.314	2	35.143	47	0.128
48	1	26.500	1	36.330	1	46.159	1	55.989	2	5.818	2	15.648	2	25.477	2	35.307	48	0.131
49	1	26.664	1	36.493	1	46.323	1	56.153	2	5.982	2	15.812	2	25.641	2	35.471	49	0.134
50	1	26.828	1	36.657	1	46.487	1	56.316	2	6.146	2	15.976	2	25.805	2	35.635	50	0.137
51	1	26.992	1	36.821	1	46.651	1	56.480	2	6.310	2	16.139	2	25.969	2	35.798	51	0.139
52	1	27.155	1	36.985	1	46.815	1	56.644	2	6.474	2	16.303	2	26.133	2	35.962	52	0.142
53	1	27.319	1	37.149	1	46.978	1	56.808	2	6.637	2	16.467	2	26.297	2	36.126	53	0.145
54	1	27.483	1	37.313	1	47.142	1	56.972	2	6.801	2	16.631	2	26.460	2	36.290	54	0.147
55	1	27.647	1	37.476	1	47.306	1	57.136	2	6.965	2	16.795	2	26.624	2	36.454	55	0.150
56	1	27.811	1	37.640	1	47.470	1	57.299	2	7.129	2	16.959	2	26.788	2	36.618	56	0.153
57	1	27.975	1	37.804	1	47.634	1	57.463	2	7.293	2	17.122	2	26.952	2	36.781	57	0.156
58	1	28.138	1	37.968	1	47.797	1	57.627	2	7.457	2	17.286	2	27.116	2	36.945	58	0.158
59	1	28.302	1	38.132	1	47.961	1	57.791	2	7.620	2	17.450	2	27.280	2	37.109	59	0.161

SIDEREAL INTO MEAN SOLAR TIME

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL

Sidereal	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h	For Seconds	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	2 37.273	2 47.102	2 56.932	3 6.762	3 16.591	3 26.421	3 36.250	3 46.080	0	0.000
1	2 37.437	2 47.266	2 57.096	3 6.925	3 16.755	3 26.585	3 36.414	3 46.244	1	0.003
2	2 37.601	2 47.430	2 57.260	3 7.089	3 16.919	3 26.748	3 36.578	3 46.407	2	0.005
3	2 37.764	2 47.594	2 57.424	3 7.253	3 17.083	3 26.912	3 36.742	3 46.571	3	0.008
4	2 37.928	2 47.758	2 57.587	3 7.417	3 17.246	3 27.076	3 36.906	3 46.735	4	0.011
5	2 38.092	2 47.922	2 57.751	3 7.581	3 17.410	3 27.240	3 37.069	3 46.899	5	0.014
6	2 38.256	2 48.085	2 57.915	3 7.745	3 17.574	3 27.404	3 37.233	3 47.063	6	0.016
7	2 38.420	2 48.249	2 58.079	3 7.908	3 17.738	3 27.568	3 37.397	3 47.227	7	0.019
8	2 38.584	2 48.413	2 58.243	3 8.072	3 17.902	3 27.731	3 37.561	3 47.390	8	0.022
9	2 38.747	2 48.577	2 58.406	3 8.236	3 18.066	3 27.895	3 37.725	3 47.554	9	0.025
10	2 38.911	2 48.741	2 58.570	3 8.400	3 18.229	3 28.059	3 37.889	3 47.718	10	0.027
11	2 39.075	2 48.905	2 58.734	3 8.564	3 18.393	3 28.223	3 38.052	3 47.882	11	0.030
12	2 39.239	2 49.068	2 58.898	3 8.728	3 18.557	3 28.387	3 38.216	3 48.046	12	0.033
13	2 39.403	2 49.232	2 59.062	3 8.891	3 18.721	3 28.550	3 38.380	3 48.210	13	0.035
14	2 39.566	2 49.396	2 59.226	3 9.055	3 18.885	3 28.714	3 38.544	3 48.373	14	0.038
15	2 39.730	2 49.560	2 59.389	3 9.219	3 19.049	3 28.878	3 38.708	3 48.537	15	0.041
16	2 39.894	2 49.724	2 59.553	3 9.383	3 19.212	3 29.042	3 38.871	3 48.701	16	0.044
17	2 40.058	2 49.888	2 59.717	3 9.547	3 19.376	3 29.206	3 39.035	3 48.865	17	0.046
18	2 40.222	2 50.051	2 59.881	3 9.710	3 19.540	3 29.370	3 39.199	3 49.029	18	0.049
19	2 40.386	2 50.215	3 0.045	3 9.874	3 19.704	3 29.533	3 39.363	3 49.193	19	0.052
20	2 40.549	2 50.379	3 0.209	3 10.038	3 19.868	3 29.697	3 39.527	3 49.356	20	0.055
21	2 40.713	2 50.543	3 0.372	3 10.202	3 20.032	3 29.861	3 39.691	3 49.520	21	0.057
22	2 40.877	2 50.707	3 0.536	3 10.366	3 20.195	3 30.025	3 39.854	3 49.684	22	0.060
23	2 41.041	2 50.870	3 0.700	3 10.530	3 20.359	3 30.189	3 40.018	3 49.848	23	0.063
24	2 41.205	2 51.034	3 0.864	3 10.693	3 20.523	3 30.353	3 40.182	3 50.012	24	0.066
25	2 41.369	2 51.198	3 1.028	3 10.857	3 20.687	3 30.516	3 40.346	3 50.175	25	0.068
26	2 41.532	2 51.362	3 1.192	3 11.021	3 20.851	3 30.680	3 40.510	3 50.339	26	0.071
27	2 41.696	2 51.526	3 1.355	3 11.185	3 21.014	3 30.844	3 40.674	3 50.503	27	0.074
28	2 41.860	2 51.690	3 1.519	3 11.349	3 21.178	3 31.008	3 40.837	3 50.667	28	0.076
29	2 42.024	2 51.853	3 1.683	3 11.513	3 21.342	3 31.172	3 41.001	3 50.831	29	0.079
30	2 42.188	2 52.017	3 1.847	3 11.676	3 21.506	3 31.336	3 41.165	3 50.995	30	0.082
31	2 42.352	2 52.181	3 2.011	3 11.840	3 21.670	3 31.499	3 41.329	3 51.158	31	0.085
32	2 42.515	2 52.345	3 2.174	3 12.004	3 21.834	3 31.663	3 41.493	3 51.322	32	0.087
33	2 42.679	2 52.509	3 2.338	3 12.168	3 21.997	3 31.827	3 41.657	3 51.486	33	0.090
34	2 42.843	2 52.673	3 2.502	3 12.332	3 22.161	3 31.991	3 41.820	3 51.650	34	0.093
35	2 43.007	2 52.836	3 2.666	3 12.496	3 22.325	3 32.155	3 41.984	3 51.814	35	0.096
36	2 43.171	2 53.000	3 2.830	3 12.659	3 22.489	3 32.318	3 42.148	3 51.978	36	0.098
37	2 43.334	2 53.164	3 2.994	3 12.823	3 22.653	3 32.482	3 42.312	3 52.141	37	0.101
38	2 43.498	2 53.328	3 3.157	3 12.987	3 22.817	3 32.646	3 42.476	3 52.305	38	0.104
39	2 43.662	2 53.492	3 3.321	3 13.151	3 22.980	3 32.810	3 42.639	3 52.469	39	0.106
40	2 43.826	2 53.656	3 3.485	3 13.315	3 23.144	3 32.974	3 42.803	3 52.633	40	0.109
41	2 43.990	2 53.819	3 3.649	3 13.478	3 23.308	3 33.138	3 42.967	3 52.797	41	0.112
42	2 44.154	2 53.983	3 3.813	3 13.642	3 23.472	3 33.301	3 43.131	3 52.961	42	0.115
43	2 44.317	2 54.147	3 3.977	3 13.806	3 23.636	3 33.465	3 43.295	3 53.124	43	0.117
44	2 44.481	2 54.311	3 4.140	3 13.970	3 23.800	3 33.629	3 43.459	3 53.288	44	0.120
45	2 44.645	2 54.475	3 4.304	3 14.134	3 23.963	3 33.793	3 43.622	3 53.452	45	0.123
46	2 44.809	2 54.638	3 4.468	3 14.298	3 24.127	3 33.957	3 43.786	3 53.616	46	0.126
47	2 44.973	2 54.802	3 4.632	3 14.461	3 24.291	3 34.121	3 43.950	3 53.780	47	0.128
48	2 45.137	2 54.966	3 4.796	3 14.625	3 24.455	3 34.284	3 44.114	3 53.943	48	0.131
49	2 45.300	2 55.130	3 4.960	3 14.789	3 24.619	3 34.448	3 44.278	3 54.107	49	0.134
50	2 45.464	2 55.294	3 5.123	3 14.953	3 24.782	3 34.612	3 44.442	3 54.271	50	0.137
51	2 45.628	2 55.458	3 5.287	3 15.117	3 24.946	3 34.776	3 44.605	3 54.435	51	0.139
52	2 45.792	2 55.621	3 5.451	3 15.281	3 25.110	3 34.940	3 44.769	3 54.599	52	0.142
53	2 45.956	2 55.785	3 5.615	3 15.444	3 25.274	3 35.104	3 44.933	3 54.763	53	0.145
54	2 46.120	2 55.949	3 5.779	3 15.608	3 25.438	3 35.267	3 45.097	3 54.926	54	0.147
55	2 46.283	2 56.113	3 5.942	3 15.772	3 25.602	3 35.431	3 45.261	3 55.090	55	0.150
56	2 46.447	2 56.277	3 6.106	3 15.936	3 25.765	3 35.595	3 45.425	3 55.254	56	0.153
57	2 46.611	2 56.441	3 6.270	3 16.100	3 25.929	3 35.759	3 45.588	3 55.418	57	0.156
58	2 46.775	2 56.604	3 6.434	3 16.264	3 26.093	3 35.923	3 45.752	3 55.582	58	0.158
59	2 46.939	2 56.768	3 6.598	3 16.427	3 26.257	3 36.086	3 45.916	3 55.746	59	0.161

MEAN SOLAR INTO SIDEREAL TIME
TO BE ADDED TO A MEAN TIME INTERVAL

Mean Solar	0 ^h		1 ^h		2 ^h		3 ^h		4 ^h		5 ^h		6 ^h		7 ^h		For Seconds	
	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	s	s
0	0	0.000	0	9.856	0	19.713	0	29.569	0	39.426	0	49.282	0	59.139	1	8.995	0	0.000
1	0	0.164	0	10.021	0	19.877	0	29.734	0	39.590	0	49.447	0	59.303	1	9.160	1	0.003
2	0	0.329	0	10.185	0	20.041	0	29.898	0	39.754	0	49.611	0	59.467	1	9.324	2	0.005
3	0	0.493	0	10.349	0	20.206	0	30.062	0	39.919	0	49.775	0	59.632	1	9.488	3	0.008
4	0	0.657	0	10.514	0	20.370	0	30.227	0	40.083	0	49.939	0	59.796	1	9.652	4	0.011
5	0	0.821	0	10.678	0	20.534	0	30.391	0	40.247	0	50.104	0	59.960	1	9.817	5	0.014
6	0	0.986	0	10.842	0	20.699	0	30.555	0	40.412	0	50.268	1	0.124	1	9.981	6	0.016
7	0	1.150	0	11.006	0	20.863	0	30.719	0	40.576	0	50.432	1	0.289	1	10.145	7	0.019
8	0	1.314	0	11.171	0	21.027	0	30.884	0	40.740	0	50.597	1	0.453	1	10.310	8	0.022
9	0	1.478	0	11.335	0	21.191	0	31.048	0	40.904	0	50.761	1	0.617	1	10.474	9	0.025
10	0	1.643	0	11.499	0	21.356	0	31.212	0	41.069	0	50.925	1	0.782	1	10.638	10	0.027
11	0	1.807	0	11.663	0	21.520	0	31.376	0	41.233	0	51.089	1	0.946	1	10.802	11	0.030
12	0	1.971	0	11.828	0	21.684	0	31.541	0	41.397	0	51.254	1	1.110	1	10.967	12	0.033
13	0	2.136	0	11.992	0	21.849	0	31.705	0	41.561	0	51.418	1	1.274	1	11.131	13	0.036
14	0	2.300	0	12.156	0	22.013	0	31.869	0	41.726	0	51.582	1	1.439	1	11.295	14	0.038
15	0	2.464	0	12.321	0	22.177	0	32.034	0	41.890	0	51.746	1	1.603	1	11.459	15	0.041
16	0	2.628	0	12.485	0	22.341	0	32.198	0	42.054	0	51.911	1	1.767	1	11.624	16	0.044
17	0	2.793	0	12.649	0	22.506	0	32.362	0	42.219	0	52.075	1	1.932	1	11.788	17	0.047
18	0	2.957	0	12.813	0	22.670	0	32.526	0	42.383	0	52.239	1	2.096	1	11.952	18	0.049
19	0	3.121	0	12.978	0	22.834	0	32.691	0	42.547	0	52.404	1	2.260	1	12.117	19	0.052
20	0	3.285	0	13.142	0	22.998	0	32.855	0	42.711	0	52.568	1	2.424	1	12.281	20	0.055
21	0	3.450	0	13.306	0	23.163	0	33.019	0	42.876	0	52.732	1	2.589	1	12.445	21	0.057
22	0	3.614	0	13.471	0	23.327	0	33.183	0	43.040	0	52.896	1	2.753	1	12.609	22	0.060
23	0	3.778	0	13.635	0	23.491	0	33.348	0	43.204	0	53.061	1	2.917	1	12.774	23	0.063
24	0	3.943	0	13.799	0	23.656	0	33.512	0	43.368	0	53.225	1	3.081	1	12.938	24	0.066
25	0	4.107	0	13.963	0	23.820	0	33.676	0	43.533	0	53.389	1	3.246	1	13.102	25	0.068
26	0	4.271	0	14.128	0	23.984	0	33.841	0	43.697	0	53.554	1	3.410	1	13.266	26	0.071
27	0	4.435	0	14.292	0	24.148	0	34.005	0	43.861	0	53.718	1	3.574	1	13.431	27	0.074
28	0	4.600	0	14.456	0	24.313	0	34.169	0	44.026	0	53.882	1	3.739	1	13.595	28	0.077
29	0	4.764	0	14.620	0	24.477	0	34.333	0	44.190	0	54.046	1	3.903	1	13.759	29	0.079
30	0	4.928	0	14.785	0	24.641	0	34.498	0	44.354	0	54.211	1	4.067	1	13.924	30	0.082
31	0	5.093	0	14.949	0	24.805	0	34.662	0	44.518	0	54.375	1	4.231	1	14.088	31	0.085
32	0	5.257	0	15.113	0	24.970	0	34.826	0	44.683	0	54.539	1	4.396	1	14.252	32	0.088
33	0	5.421	0	15.278	0	25.134	0	34.990	0	44.847	0	54.703	1	4.560	1	14.416	33	0.090
34	0	5.585	0	15.442	0	25.298	0	35.155	0	45.011	0	54.868	1	4.724	1	14.581	34	0.093
35	0	5.750	0	15.606	0	25.463	0	35.319	0	45.176	0	55.032	1	4.888	1	14.745	35	0.096
36	0	5.914	0	15.770	0	25.627	0	35.483	0	45.340	0	55.196	1	5.053	1	14.909	36	0.099
37	0	6.078	0	15.935	0	25.791	0	35.648	0	45.504	0	55.361	1	5.217	1	15.073	37	0.101
38	0	6.242	0	16.099	0	25.955	0	35.812	0	45.668	0	55.525	1	5.381	1	15.238	38	0.104
39	0	6.407	0	16.263	0	26.120	0	35.976	0	45.833	0	55.689	1	5.546	1	15.402	39	0.107
40	0	6.571	0	16.427	0	26.284	0	36.140	0	45.997	0	55.853	1	5.710	1	15.566	40	0.110
41	0	6.735	0	16.592	0	26.448	0	36.305	0	46.161	0	56.018	1	5.874	1	15.731	41	0.112
42	0	6.900	0	16.756	0	26.612	0	36.469	0	46.325	0	56.182	1	6.038	1	15.895	42	0.115
43	0	7.064	0	16.920	0	26.777	0	36.633	0	46.490	0	56.346	1	6.203	1	16.059	43	0.118
44	0	7.228	0	17.085	0	26.941	0	36.798	0	46.654	0	56.510	1	6.367	1	16.223	44	0.120
45	0	7.392	0	17.249	0	27.105	0	36.962	0	46.818	0	56.675	1	6.531	1	16.388	45	0.123
46	0	7.557	0	17.413	0	27.270	0	37.126	0	46.983	0	56.839	1	6.695	1	16.552	46	0.126
47	0	7.721	0	17.577	0	27.434	0	37.290	0	47.147	0	57.003	1	6.860	1	16.716	47	0.129
48	0	7.885	0	17.742	0	27.598	0	37.455	0	47.311	0	57.168	1	7.024	1	16.881	48	0.131
49	0	8.049	0	17.906	0	27.762	0	37.619	0	47.475	0	57.332	1	7.188	1	17.045	49	0.134
50	0	8.214	0	18.070	0	27.927	0	37.783	0	47.640	0	57.496	1	7.353	1	17.209	50	0.137
51	0	8.378	0	18.234	0	28.091	0	37.947	0	47.804	0	57.660	1	7.517	1	17.373	51	0.140
52	0	8.542	0	18.399	0	28.255	0	38.112	0	47.968	0	57.825	1	7.681	1	17.538	52	0.142
53	0	8.707	0	18.563	0	28.420	0	38.276	0	48.132	0	57.989	1	7.845	1	17.702	53	0.145
54	0	8.871	0	18.727	0	28.584	0	38.440	0	48.297	0	58.153	1	8.010	1	17.866	54	0.148
55	0	9.035	0	18.892	0	28.748	0	38.605	0	48.461	0	58.317	1	8.174	1	18.030	55	0.151
56	0	9.199	0	19.056	0	28.912	0	38.769	0	48.625	0	58.482	1	8.338	1	18.195	56	0.153
57	0	9.364	0	19.220	0	29.077	0	38.933	0	48.790	0	58.646	1	8.502	1	18.359	57	0.156
58	0	9.528	0	19.384	0	29.241	0	39.097	0	48.954	0	58.810	1	8.667	1	18.523	58	0.159
59	0	9.692	0	19.549	0	29.405	0	39.262	0	49.118	0	58.975	1	8.831	1	18.688	59	0.162

MEAN SOLAR INTO SIDEREAL TIME
TO BE ADDED TO A MEAN TIME INTERVAL

Mean Solar	8 ^h	9 ^h	10 ^h	11 ^h	12 ^h	13 ^h	14 ^h	15 ^h	For Seconds	
m	m	s	m	s	m	s	m	s	s	s
0	1	18.852	1	28.708	1	38.565	1	48.421	1	58.278
1	1	19.016	1	28.873	1	38.729	1	48.585	1	58.442
2	1	19.180	1	29.037	1	38.893	1	48.750	1	58.606
3	1	19.345	1	29.201	1	39.058	1	48.914	1	58.771
4	1	19.509	1	29.365	1	39.222	1	49.078	1	58.935
5	1	19.673	1	29.530	1	39.386	1	49.243	1	59.099
6	1	19.837	1	29.694	1	39.550	1	49.407	1	59.263
7	1	20.002	1	29.858	1	39.715	1	49.571	1	59.428
8	1	20.166	1	30.022	1	39.879	1	49.735	1	59.592
9	1	20.330	1	30.187	1	40.043	1	49.900	1	59.756
10	1	20.495	1	30.351	1	40.207	1	50.064	1	59.920
11	1	20.659	1	30.515	1	40.372	1	50.228	2	0.085
12	1	20.823	1	30.680	1	40.536	1	50.393	2	0.249
13	1	20.987	1	30.844	1	40.700	1	50.557	2	0.413
14	1	21.152	1	31.008	1	40.865	1	50.721	2	0.578
15	1	21.316	1	31.172	1	41.029	1	50.885	2	0.742
16	1	21.480	1	31.337	1	41.193	1	51.050	2	0.906
17	1	21.644	1	31.501	1	41.357	1	51.214	2	1.070
18	1	21.809	1	31.665	1	41.522	1	51.378	2	1.235
19	1	21.973	1	31.829	1	41.686	1	51.542	2	1.399
20	1	22.137	1	31.994	1	41.850	1	51.707	2	1.563
21	1	22.302	1	32.158	1	42.015	1	51.871	2	1.727
22	1	22.466	1	32.322	1	42.179	1	52.035	2	1.892
23	1	22.630	1	32.487	1	42.343	1	52.200	2	2.056
24	1	22.794	1	32.651	1	42.507	1	52.364	2	2.220
25	1	22.959	1	32.815	1	42.672	1	52.528	2	2.385
26	1	23.123	1	32.979	1	42.836	1	52.692	2	2.549
27	1	23.287	1	33.144	1	43.000	1	52.857	2	2.713
28	1	23.451	1	33.308	1	43.164	1	53.021	2	2.877
29	1	23.616	1	33.472	1	43.329	1	53.185	2	3.042
30	1	23.780	1	33.637	1	43.493	1	53.349	2	3.206
31	1	23.944	1	33.801	1	43.657	1	53.514	2	3.370
32	1	24.109	1	33.965	1	43.822	1	53.678	2	3.534
33	1	24.273	1	34.129	1	43.986	1	53.842	2	3.699
34	1	24.437	1	34.294	1	44.150	1	54.007	2	3.863
35	1	24.601	1	34.458	1	44.314	1	54.171	2	4.027
36	1	24.766	1	34.622	1	44.479	1	54.335	2	4.192
37	1	24.930	1	34.786	1	44.643	1	54.499	2	4.356
38	1	25.094	1	34.951	1	44.807	1	54.664	2	4.520
39	1	25.259	1	35.115	1	44.971	1	54.828	2	4.684
40	1	25.423	1	35.279	1	45.136	1	54.992	2	4.849
41	1	25.587	1	35.444	1	45.300	1	55.156	2	5.013
42	1	25.751	1	35.608	1	45.464	1	55.321	2	5.177
43	1	25.916	1	35.772	1	45.629	1	55.485	2	5.342
44	1	26.080	1	35.936	1	45.793	1	55.649	2	5.506
45	1	26.244	1	36.101	1	45.957	1	55.814	2	5.670
46	1	26.408	1	36.265	1	46.121	1	55.978	2	5.834
47	1	26.573	1	36.429	1	46.286	1	56.142	2	5.999
48	1	26.737	1	36.593	1	46.450	1	56.306	2	6.163
49	1	26.901	1	36.758	1	46.614	1	56.471	2	6.327
50	1	27.066	1	36.922	1	46.778	1	56.635	2	6.491
51	1	27.230	1	37.086	1	46.943	1	56.799	2	6.656
52	1	27.394	1	37.251	1	47.107	1	56.964	2	6.820
53	1	27.558	1	37.415	1	47.271	1	57.128	2	6.984
54	1	27.723	1	37.579	1	47.436	1	57.292	2	7.149
55	1	27.887	1	37.743	1	47.600	1	57.456	2	7.313
56	1	28.051	1	37.908	1	47.764	1	57.621	2	7.477
57	1	28.215	1	38.072	1	47.928	1	57.785	2	7.641
58	1	28.380	1	38.236	1	48.093	1	57.949	2	7.806
59	1	28.544	1	38.400	1	48.257	1	58.113	2	7.970

MEAN SOLAR INTO SIDEREAL TIME
TO BE ADDED TO A MEAN TIME INTERVAL

Mean Solar	16 ^h		17 ^h		18 ^h		19 ^h		20 ^h		21 ^h		22 ^h		23 ^h		For Seconds	
	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	s	s
0	2	37.704	2	47.560	2	57.417	3	7.273	3	17.129	3	26.986	3	36.842	3	46.699	0	0.000
1	2	37.868	2	47.724	2	57.581	3	7.437	3	17.294	3	27.150	3	37.007	3	46.863	1	0.003
2	2	38.032	2	47.889	2	57.745	3	7.602	3	17.458	3	27.315	3	37.171	3	47.027	2	0.005
3	2	38.196	2	48.053	2	57.909	3	7.766	3	17.622	3	27.479	3	37.335	3	47.192	3	0.008
4	2	38.361	2	48.217	2	58.074	3	7.930	3	17.787	3	27.643	3	37.500	3	47.356	4	0.011
5	2	38.525	2	48.381	2	58.238	3	8.094	3	17.951	3	27.807	3	37.664	3	47.520	5	0.014
6	2	38.689	2	48.546	2	58.402	3	8.259	3	18.115	3	27.972	3	37.828	3	47.685	6	0.016
7	2	38.854	2	48.710	2	58.566	3	8.423	3	18.279	3	28.136	3	37.992	3	47.849	7	0.019
8	2	39.018	2	48.874	2	58.731	3	8.587	3	18.444	3	28.300	3	38.157	3	48.013	8	0.022
9	2	39.182	2	49.039	2	58.895	3	8.751	3	18.608	3	28.464	3	38.321	3	48.177	9	0.025
10	2	39.346	2	49.203	2	59.059	3	8.916	3	18.772	3	28.629	3	38.485	3	48.342	10	0.027
11	2	39.511	2	49.367	2	59.224	3	9.080	3	18.937	3	28.793	3	38.649	3	48.506	11	0.030
12	2	39.675	2	49.531	2	59.388	3	9.244	3	19.101	3	28.957	3	38.814	3	48.670	12	0.033
13	2	39.839	2	49.696	2	59.552	3	9.409	3	19.265	3	29.122	3	38.978	3	48.834	13	0.036
14	2	40.003	2	49.860	2	59.716	3	9.573	3	19.429	3	29.286	3	39.142	3	48.999	14	0.038
15	2	40.168	2	50.024	2	59.881	3	9.737	3	19.594	3	29.450	3	39.307	3	49.163	15	0.041
16	2	40.332	2	50.188	3	0.045	3	9.901	3	19.758	3	29.614	3	39.471	3	49.327	16	0.044
17	2	40.496	2	50.353	3	0.209	3	10.066	3	19.922	3	29.779	3	39.635	3	49.492	17	0.047
18	2	40.661	2	50.517	3	0.373	3	10.230	3	20.086	3	29.943	3	39.799	3	49.656	18	0.049
19	2	40.825	2	50.681	3	0.538	3	10.394	3	20.251	3	30.107	3	39.964	3	49.820	19	0.052
20	2	40.989	2	50.846	3	0.702	3	10.559	3	20.415	3	30.271	3	40.128	3	49.984	20	0.055
21	2	41.153	2	51.010	3	0.866	3	10.723	3	20.579	3	30.436	3	40.292	3	50.149	21	0.057
22	2	41.318	2	51.174	3	1.031	3	10.887	3	20.744	3	30.600	3	40.456	3	50.313	22	0.060
23	2	41.482	2	51.338	3	1.195	3	11.051	3	20.908	3	30.764	3	40.621	3	50.477	23	0.063
24	2	41.646	2	51.503	3	1.359	3	11.216	3	21.072	3	30.929	3	40.785	3	50.642	24	0.066
25	2	41.810	2	51.667	3	1.523	3	11.380	3	21.236	3	31.093	3	40.949	3	50.806	25	0.068
26	2	41.975	2	51.831	3	1.688	3	11.544	3	21.401	3	31.257	3	41.114	3	50.970	26	0.071
27	2	42.139	2	51.995	3	1.852	3	11.708	3	21.565	3	31.421	3	41.278	3	51.134	27	0.074
28	2	42.303	2	52.160	3	2.016	3	11.873	3	21.729	3	31.586	3	41.442	3	51.299	28	0.077
29	2	42.468	2	52.324	3	2.181	3	12.037	3	21.893	3	31.750	3	41.606	3	51.463	29	0.079
30	2	42.632	2	52.488	3	2.345	3	12.201	3	22.058	3	31.914	3	41.771	3	51.627	30	0.082
31	2	42.796	2	52.653	3	2.509	3	12.366	3	22.222	3	32.078	3	41.935	3	51.791	31	0.085
32	2	42.960	2	52.817	3	2.673	3	12.530	3	22.386	3	32.243	3	42.099	3	51.956	32	0.088
33	2	43.125	2	52.981	3	2.838	3	12.694	3	22.551	3	32.407	3	42.264	3	52.120	33	0.090
34	2	43.289	2	53.145	3	3.002	3	12.858	3	22.715	3	32.571	3	42.428	3	52.284	34	0.093
35	2	43.453	2	53.310	3	3.166	3	13.023	3	22.879	3	32.736	3	42.592	3	52.449	35	0.096
36	2	43.617	2	53.474	3	3.330	3	13.187	3	23.043	3	32.900	3	42.756	3	52.613	36	0.099
37	2	43.782	2	53.638	3	3.495	3	13.351	3	23.208	3	33.064	3	42.921	3	52.777	37	0.101
38	2	43.946	2	53.803	3	3.659	3	13.515	3	23.372	3	33.228	3	43.085	3	52.941	38	0.104
39	2	44.110	2	53.967	3	3.823	3	13.680	3	23.536	3	33.393	3	43.249	3	53.106	39	0.107
40	2	44.275	2	54.131	3	3.988	3	13.844	3	23.700	3	33.557	3	43.413	3	53.270	40	0.110
41	2	44.439	2	54.295	3	4.152	3	14.008	3	23.865	3	33.721	3	43.578	3	53.434	41	0.112
42	2	44.603	2	54.460	3	4.316	3	14.173	3	24.029	3	33.886	3	43.742	3	53.598	42	0.115
43	2	44.767	2	54.624	3	4.480	3	14.337	3	24.193	3	34.050	3	43.906	3	53.763	43	0.118
44	2	44.932	2	54.788	3	4.645	3	14.501	3	24.358	3	34.214	3	44.071	3	53.927	44	0.120
45	2	45.096	2	54.952	3	4.809	3	14.665	3	24.522	3	34.378	3	44.235	3	54.091	45	0.123
46	2	45.260	2	55.117	3	4.973	3	14.830	3	24.686	3	34.543	3	44.399	3	54.256	46	0.126
47	2	45.425	2	55.281	3	5.137	3	14.994	3	24.850	3	34.707	3	44.563	3	54.420	47	0.129
48	2	45.589	2	55.445	3	5.302	3	15.158	3	25.015	3	34.871	3	44.728	3	54.584	48	0.131
49	2	45.753	2	55.610	3	5.466	3	15.322	3	25.179	3	35.035	3	44.892	3	54.748	49	0.134
50	2	45.917	2	55.774	3	5.630	3	15.487	3	25.343	3	35.200	3	45.056	3	54.913	50	0.137
51	2	46.082	2	55.938	3	5.795	3	15.651	3	25.508	3	35.364	3	45.220	3	55.077	51	0.140
52	2	46.246	2	56.102	3	5.959	3	15.815	3	25.672	3	35.528	3	45.385	3	55.241	52	0.142
53	2	46.410	2	56.267	3	6.123	3	15.980	3	25.836	3	35.693	3	45.549	3	55.405	53	0.145
54	2	46.574	2	56.431	3	6.287	3	16.144	3	26.000	3	35.857	3	45.713	3	55.570	54	0.148
55	2	46.739	2	56.595	3	6.452	3	16.308	3	26.165	3	36.021	3	45.878	3	55.734	55	0.151
56	2	46.903	2	56.759	3	6.616	3	16.472	3	26.329	3	36.185	3	46.042	3	55.898	56	0.153
57	2	47.067	2	56.924	3	6.780	3	16.637	3	26.493	3	36.350	3	46.206	3	56.063	57	0.156
58	2	47.232	2	57.088	3	6.944	3	16.801	3	26.657	3	36.514	3	46.370	3	56.227	58	0.159
59	2	47.396	2	57.252	3	7.109	3	16.965	3	26.822	3	36.678	3	46.535	3	56.391	59	0.162

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1958

[For hour angles 0^h to 12^h Polaris is west of north, and for hour angles 12^h to 24^h it is east of north]

Lat.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat.
H. A.											H. A.
h m		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m
0 00		0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	24 00
10		0 02.5	0 02.5	0 02.6	0 02.6	0 02.7	0 02.7	0 02.8	0 02.8	0 02.9	23 50
20		0 04.9	0 05.1	0 05.2	0 05.3	0 05.4	0 05.4	0 05.6	0 05.7	0 05.8	40
0 30		0 07.4	0 07.6	0 07.8	0 07.9	0 08.0	0 08.2	0 08.3	0 08.5	0 08.7	23 30
40		0 09.9	0 10.1	0 10.4	0 10.5	0 10.7	0 10.9	0 11.1	0 11.3	0 11.5	20
50		0 12.3	0 12.5	0 12.9	0 13.1	0 13.3	0 13.5	0 13.8	0 14.1	0 14.4	10
1 00		0 14.7	0 15.0	0 15.4	0 15.7	0 15.9	0 16.2	0 16.5	0 16.8	0 17.2	23 00
10		0 17.1	0 17.4	0 17.9	0 18.2	0 18.5	0 18.8	0 19.1	0 19.5	0 20.0	22 50
20		0 19.4	0 19.8	0 20.4	0 20.7	0 21.0	0 21.4	0 21.8	0 22.2	0 22.7	40
1 30		0 21.7	0 22.2	0 22.8	0 23.2	0 23.5	0 23.9	0 24.4	0 24.9	0 25.4	22 30
40		0 24.0	0 24.5	0 25.2	0 25.6	0 26.0	0 26.4	0 26.9	0 27.4	0 28.0	20
50		0 26.2	0 26.8	0 27.5	0 27.9	0 28.4	0 28.8	0 29.4	0 30.0	0 30.6	10
2 00		0 28.4	0 29.0	0 29.8	0 30.2	0 30.7	0 31.2	0 31.8	0 32.5	0 33.2	22 00
10		0 30.5	0 31.1	0 32.0	0 32.5	0 33.0	0 33.6	0 34.2	0 34.9	0 35.6	21 50
20		0 32.5	0 33.2	0 34.2	0 34.7	0 35.2	0 35.8	0 36.5	0 37.2	0 38.0	40
2 30		0 34.5	0 35.3	0 36.3	0 36.8	0 37.4	0 38.0	0 38.7	0 39.5	0 40.3	21 30
40		0 36.5	0 37.2	0 38.3	0 38.8	0 39.4	0 40.1	0 40.9	0 41.7	0 42.6	20
50		0 38.3	0 39.1	0 40.3	0 40.8	0 41.4	0 42.2	0 42.9	0 43.8	0 44.7	10
3 00		0 40.1	0 40.9	0 42.1	0 42.7	0 43.4	0 44.1	0 44.9	0 45.8	0 46.8	21 00
10		0 41.8	0 42.7	0 43.9	0 44.5	0 45.2	0 46.0	0 46.8	0 47.8	0 48.8	20 50
20		0 43.4	0 44.3	0 45.6	0 46.3	0 47.0	0 47.8	0 48.6	0 49.6	0 50.7	40
3 30		0 45.0	0 45.9	0 47.2	0 47.9	0 48.6	0 49.4	0 50.4	0 51.4	0 52.5	20 30
40		0 46.4	0 47.4	0 48.8	0 49.4	0 50.2	0 51.0	0 52.0	0 53.0	0 54.2	20
50		0 47.8	0 48.8	0 50.2	0 50.9	0 51.7	0 52.5	0 53.5	0 54.6	0 55.7	10
4 00		0 49.1	0 50.1	0 51.5	0 52.2	0 53.0	0 53.9	0 54.9	0 56.0	0 57.2	20 00
10		0 50.3	0 51.3	0 52.8	0 53.5	0 54.3	0 55.2	0 56.2	0 57.3	0 58.6	19 50
20		0 51.4	0 52.4	0 53.9	0 54.6	0 55.5	0 56.4	0 57.4	0 58.6	0 59.8	40
4 30		0 52.4	0 53.4	0 54.9	0 55.7	0 56.5	0 57.5	0 58.5	0 59.7	1 01.0	19 30
40		0 53.2	0 54.3	0 55.9	0 56.6	0 57.5	0 58.4	0 59.5	1 00.7	1 02.0	20
50		0 54.0	0 55.1	0 56.7	0 57.5	0 58.3	0 59.3	1 00.4	1 01.6	1 02.9	10
5 00		0 54.7	0 55.8	0 57.4	0 58.2	0 59.1	1 00.0	1 01.1	1 02.3	1 03.7	19 00
10		0 55.3	0 56.4	0 58.0	0 58.8	0 59.7	1 00.7	1 01.8	1 03.0	1 04.3	18 50
20		0 55.8	0 56.9	0 58.5	0 59.3	1 00.2	1 01.2	1 02.3	1 03.5	1 04.9	40
5 30		0 56.1	0 57.3	0 58.9	0 59.7	1 00.6	1 01.6	1 02.7	1 03.9	1 05.3	18 30
40		0 56.4	0 57.5	0 59.1	0 59.9	1 00.8	1 01.8	1 02.9	1 04.2	1 05.5	20
50		0 56.6	0 57.7	0 59.3	1 00.1	1 01.0	1 02.0	1 03.1	1 04.3	1 05.7	10
6 00		0 56.6	0 57.7	0 59.3	1 00.1	1 01.0	1 02.0	1 03.1	1 04.4	1 05.7	18 00
10		0 56.5	0 57.7	0 59.3	1 00.1	1 00.9	1 01.9	1 03.1	1 04.3	1 05.6	17 50
20		0 56.4	0 57.5	0 59.1	0 59.9	1 00.8	1 01.7	1 02.9	1 04.1	1 05.4	40
6 30		0 56.1	0 57.2	0 58.8	0 59.6	1 00.4	1 01.4	1 02.5	1 03.7	1 05.1	17 30
40		0 55.7	0 56.8	0 58.4	0 59.1	1 00.0	1 01.0	1 02.1	1 03.3	1 04.6	20
50		0 55.2	0 56.3	0 57.8	0 58.6	0 59.5	1 00.5	1 01.5	1 02.7	1 04.0	10
7 00		0 54.6	0 55.7	0 57.2	0 58.0	0 58.8	0 59.8	1 00.9	1 02.0	1 03.3	17 00
10		0 53.9	0 55.0	0 56.5	0 57.2	0 58.1	0 59.0	1 00.1	1 01.2	1 02.5	16 50
20		0 53.1	0 54.2	0 55.6	0 56.4	0 57.2	0 58.1	0 59.2	1 00.3	1 01.6	40
7 30		0 52.2	0 53.2	0 54.7	0 55.4	0 56.2	0 57.1	0 58.1	0 59.3	1 00.5	16 30
40		0 51.2	0 52.2	0 53.6	0 54.3	0 55.1	0 56.0	0 57.0	0 58.1	0 59.3	20
50		0 50.1	0 51.1	0 52.5	0 53.2	0 54.0	0 54.8	0 55.8	0 56.9	0 58.0	10
8 00		0 49.0	0 49.9	0 51.2	0 51.9	0 52.7	0 53.5	0 54.4	0 55.5	0 56.6	16 00
10		0 47.7	0 48.6	0 49.9	0 50.5	0 51.3	0 52.1	0 53.0	0 54.0	0 55.1	15 50
20		0 46.3	0 47.2	0 48.4	0 49.1	0 49.8	0 50.6	0 51.5	0 52.5	0 53.5	40
8 30		0 44.8	0 45.7	0 46.9	0 47.5	0 48.2	0 49.0	0 49.8	0 50.8	0 51.8	15 30
40		0 43.3	0 44.1	0 45.3	0 45.9	0 46.5	0 47.3	0 48.1	0 49.0	0 50.0	20
50		0 41.7	0 42.4	0 43.6	0 44.1	0 44.8	0 45.5	0 46.3	0 47.2	0 48.1	10
9 00		0 40.0	0 40.7	0 41.8	0 42.3	0 42.9	0 43.6	0 44.4	0 45.2	0 46.2	15 00

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1958.

[For hour angles 0^h to 12^h Polaris is west of north, and for hour angles 12^h to 24^h it is east of north]

Lat.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat.
H. A.											H. A.
h m		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m
9 00		0 40.0	0 40.7	0 41.8	0 42.3	0 42.9	0 43.6	0 44.4	0 45.2	0 46.2	15 00
10		0 38.2	0 38.9	0 39.9	0 40.4	0 41.0	0 41.7	0 42.4	0 43.2	0 44.1	14 50
20		0 36.3	0 37.0	0 38.0	0 38.5	0 39.0	0 39.6	0 40.3	0 41.1	0 41.9	40
9 30		0 34.4	0 35.0	0 36.0	0 36.4	0 36.9	0 37.5	0 38.2	0 38.9	0 39.7	14 30
40		0 32.4	0 33.0	0 33.9	0 34.3	0 34.8	0 35.4	0 36.0	0 36.6	0 37.4	20
50		0 30.3	0 30.9	0 31.7	0 32.1	0 32.6	0 33.1	0 33.7	0 34.3	0 35.0	10
10 00		0 28.2	0 28.8	0 29.5	0 29.9	0 30.3	0 30.8	0 31.3	0 31.9	0 32.6	14 00
10		0 26.1	0 26.6	0 27.3	0 27.6	0 28.0	0 28.4	0 28.9	0 29.5	0 30.1	13 50
20		0 23.9	0 24.3	0 24.9	0 25.3	0 25.6	0 26.0	0 26.5	0 27.0	0 27.5	40
10 30		0 21.6	0 22.0	0 22.6	0 22.9	0 23.2	0 23.6	0 24.0	0 24.4	0 24.9	13 30
40		0 19.3	0 19.7	0 20.2	0 20.4	0 20.7	0 21.1	0 21.4	0 21.8	0 22.3	20
50		0 17.0	0 17.3	0 17.7	0 18.0	0 18.2	0 18.5	0 18.8	0 19.2	0 19.6	10
11 00		0 14.6	0 14.9	0 15.3	0 15.5	0 15.7	0 15.9	0 16.2	0 16.5	0 16.9	13 00
10		0 12.2	0 12.4	0 12.8	0 12.9	0 13.1	0 13.3	0 13.6	0 13.8	0 14.1	12 50
20		0 09.8	0 10.0	0 10.2	0 10.4	0 10.5	0 10.7	0 10.9	0 11.1	0 11.3	40
11 30		0 07.4	0 07.5	0 07.7	0 07.8	0 07.9	0 08.0	0 08.2	0 08.3	0 08.5	12 30
40		0 04.9	0 05.0	0 05.1	0 05.2	0 05.3	0 05.4	0 05.5	0 05.6	0 05.7	20
50		0 02.5	0 02.5	0 02.6	0 02.6	0 02.6	0 02.7	0 02.7	0 02.8	0 02.8	10
12 00		0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	12 00

Lat.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat.
H. A.											H. A.
h m		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m
0 00		0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	24 00
10		0 02.9	0 03.0	0 03.0	0 03.1	0 03.2	0 03.3	0 03.4	0 03.6	0 03.7	23 50
20		0 05.8	0 05.9	0 06.1	0 06.2	0 06.4	0 06.6	0 06.9	0 07.1	0 07.4	40
0 30		0 08.7	0 08.9	0 09.1	0 09.4	0 09.6	0 09.9	0 10.3	0 10.7	0 11.1	23 30
40		0 11.5	0 11.8	0 12.1	0 12.4	0 12.8	0 13.2	0 13.7	0 14.2	0 14.7	20
50		0 14.4	0 14.7	0 15.1	0 15.5	0 16.0	0 16.5	0 17.0	0 17.7	0 18.4	10
1 00		0 17.2	0 17.6	0 18.0	0 18.5	0 19.1	0 19.7	0 20.4	0 21.1	0 21.9	23 00
10		0 20.0	0 20.4	0 21.0	0 21.5	0 22.2	0 22.9	0 23.7	0 24.5	0 25.5	22 50
20		0 22.7	0 23.2	0 23.8	0 24.5	0 25.2	0 26.0	0 26.9	0 27.9	0 29.0	40
1 30		0 25.4	0 26.0	0 26.7	0 27.4	0 28.2	0 29.1	0 30.1	0 31.2	0 32.4	22 30
40		0 28.0	0 28.7	0 29.4	0 30.2	0 31.1	0 32.1	0 33.2	0 34.4	0 35.8	20
50		0 30.6	0 31.4	0 32.2	0 33.0	0 34.0	0 35.1	0 36.3	0 37.6	0 39.1	10
2 00		0 33.2	0 33.9	0 34.8	0 35.8	0 36.8	0 38.0	0 39.3	0 40.7	0 42.3	22 00
10		0 35.6	0 36.5	0 37.4	0 38.4	0 39.6	0 40.8	0 42.2	0 43.7	0 45.5	21 50
20		0 38.0	0 38.9	0 39.9	0 41.0	0 42.2	0 43.6	0 45.0	0 46.7	0 48.5	40
2 30		0 40.3	0 41.3	0 42.3	0 43.5	0 44.8	0 46.2	0 47.8	0 49.5	0 51.5	21 30
40		0 42.6	0 43.6	0 44.7	0 45.9	0 47.3	0 48.8	0 50.4	0 52.3	0 54.3	20
50		0 44.7	0 45.8	0 47.0	0 48.2	0 49.7	0 51.2	0 53.0	0 54.9	0 57.0	10
3 00		0 46.8	0 47.9	0 49.1	0 50.5	0 52.0	0 53.6	0 55.4	0 57.4	0 59.7	21 00
10		0 48.8	0 49.9	0 51.2	0 52.6	0 54.2	0 55.9	0 57.8	0 59.8	1 02.2	20 50
20		0 50.7	0 51.9	0 53.2	0 54.6	0 56.2	0 58.0	1 00.0	1 02.1	1 04.6	40
3 30		0 52.5	0 53.7	0 55.1	0 56.6	0 58.2	1 00.0	1 02.1	1 04.3	1 06.8	20 30
40		0 54.2	0 55.4	0 56.8	0 58.4	1 00.1	1 02.0	1 04.1	1 06.4	1 09.0	20
50		0 55.7	0 57.0	0 58.5	1 00.1	1 01.8	1 03.8	1 05.9	1 08.3	1 11.0	10
4 00		0 57.2	0 58.6	1 00.0	1 01.7	1 03.5	1 05.4	1 07.6	1 10.1	1 12.8	20 00
10		0 58.6	1 00.0	1 01.5	1 03.1	1 05.0	1 07.0	1 09.2	1 11.7	1 14.5	19 50
20		0 59.8	1 01.2	1 02.8	1 04.5	1 06.3	1 08.4	1 10.7	1 13.3	1 16.1	40
4 30		1 01.0	1 02.4	1 04.0	1 05.7	1 07.6	1 09.7	1 12.0	1 14.6	1 17.5	19 30
40		1 02.0	1 03.4	1 05.0	1 06.8	1 08.7	1 10.8	1 13.2	1 15.8	1 18.8	20
50		1 02.9	1 04.3	1 06.0	1 07.7	1 09.7	1 11.9	1 14.3	1 16.9	1 19.9	10
5 00		1 03.7	1 05.1	1 06.8	1 08.6	1 10.5	1 12.7	1 15.2	1 17.9	1 20.8	19 00

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1958

[For hour angles 0^h to 12^h Polaris is west of north, and for hour angles 12^h to 24^h it is east of north]

Lat. H. A.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H. A.	
h m		° '	° '	° '	° '	° '	° '	° '	° '	° '	h m	
5	00	1 03.7	1 05.1	1 06.8	1 08.6	1 10.5	1 12.7	1 15.2	1 17.9	1 20.8	19	00
	10	1 04.3	1 05.8	1 07.4	1 09.3	1 11.3	1 13.5	1 15.9	1 18.6	1 21.7	18	50
	20	1 04.9	1 06.3	1 08.0	1 09.8	1 11.8	1 14.1	1 16.5	1 19.3	1 22.3		40
5	30	1 05.3	1 06.8	1 08.4	1 10.3	1 12.3	1 14.5	1 17.0	1 19.7	1 22.8	18	30
	40	1 05.5	1 07.1	1 08.7	1 10.6	1 12.6	1 14.8	1 17.3	1 20.1	1 23.1		20
	50	1 05.7	1 07.2	1 08.9	1 10.7	1 12.7	1 15.0	1 17.5	1 20.2	1 23.3		10
6	00	1 05.7	1 07.2	1 08.9	1 10.7	1 12.8	1 15.0	1 17.5	1 20.2	1 23.3	18	00
	10	1 05.6	1 07.1	1 08.8	1 10.6	1 12.7	1 14.9	1 17.4	1 20.1	1 23.2	17	50
	20	1 05.4	1 06.9	1 08.6	1 10.4	1 12.4	1 14.6	1 17.1	1 19.8	1 22.9		40
6	30	1 05.1	1 06.6	1 08.2	1 10.0	1 12.0	1 14.2	1 16.7	1 19.4	1 22.4	17	30
	40	1 04.6	1 06.1	1 07.7	1 09.5	1 11.5	1 13.7	1 16.1	1 18.8	1 21.8		20
	50	1 04.0	1 05.5	1 07.1	1 08.9	1 10.8	1 13.0	1 15.4	1 18.1	1 21.0		10
7	00	1 03.3	1 04.8	1 06.4	1 08.1	1 10.0	1 12.2	1 14.6	1 17.2	1 20.1	17	00
	10	1 02.5	1 03.9	1 05.5	1 07.2	1 09.1	1 11.2	1 13.6	1 16.2	1 19.0	16	50
	20	1 01.6	1 03.0	1 04.5	1 06.2	1 08.1	1 10.1	1 12.4	1 15.0	1 17.8		40
7	30	1 00.5	1 01.9	1 03.4	1 05.0	1 06.9	1 08.9	1 11.2	1 13.7	1 16.4	16	30
	40	0 59.3	1 00.7	1 02.1	1 03.8	1 05.6	1 07.6	1 09.8	1 12.2	1 14.9		20
	50	0 58.0	0 59.3	1 00.8	1 02.4	1 04.1	1 06.1	1 08.2	1 10.6	1 13.3		10
8	00	0 56.6	0 57.9	0 59.3	1 00.9	1 02.6	1 04.5	1 06.6	1 08.9	1 11.5	16	00
	10	0 55.1	0 56.4	0 57.8	0 59.3	1 00.9	1 02.8	1 04.8	1 07.1	1 09.6	15	50
	20	0 53.5	0 54.7	0 56.1	0 57.5	0 59.2	1 00.9	1 02.9	1 05.1	1 07.5		40
8	30	0 51.8	0 53.0	0 54.3	0 55.7	0 57.3	0 59.0	1 00.9	1 03.0	1 05.4	15	30
	40	0 50.0	0 51.2	0 52.4	0 53.8	0 55.3	0 56.9	0 58.8	1 00.8	1 03.1		20
	50	0 48.1	0 49.2	0 50.4	0 51.7	0 53.2	0 54.8	0 56.5	0 58.5	1 00.7		10
9	00	0 46.2	0 47.2	0 48.3	0 49.6	0 51.0	0 52.5	0 54.2	0 56.1	0 58.2	15	00
	10	0 44.1	0 45.1	0 46.2	0 47.4	0 48.7	0 50.1	0 51.8	0 53.6	0 55.6	14	50
	20	0 41.9	0 42.9	0 43.9	0 45.0	0 46.3	0 47.7	0 49.2	0 50.9	0 52.8		40
9	30	0 39.7	0 40.6	0 41.6	0 42.6	0 43.8	0 45.1	0 46.6	0 48.2	0 50.0	14	30
	40	0 37.4	0 38.2	0 39.1	0 40.2	0 41.3	0 42.5	0 43.9	0 45.4	0 47.1		20
	50	0 35.0	0 35.8	0 36.7	0 37.6	0 38.7	0 39.8	0 41.1	0 42.5	0 44.1		10
10	00	0 32.6	0 33.3	0 34.1	0 35.0	0 36.0	0 37.0	0 38.2	0 39.6	0 41.0	14	00
	10	0 30.1	0 30.8	0 31.5	0 32.3	0 33.2	0 34.2	0 35.3	0 36.5	0 37.9	13	50
	20	0 27.5	0 28.1	0 28.8	0 29.6	0 30.4	0 31.3	0 32.3	0 33.4	0 34.6		40
10	30	0 24.9	0 25.5	0 26.1	0 26.8	0 27.5	0 28.3	0 29.2	0 30.2	0 31.4	13	30
	40	0 22.3	0 22.8	0 23.3	0 23.9	0 24.6	0 25.3	0 26.1	0 27.0	0 28.0		20
	50	0 19.6	0 20.0	0 20.5	0 21.0	0 21.6	0 22.2	0 23.0	0 23.8	0 24.6		10
11	00	0 16.9	0 17.2	0 17.6	0 18.1	0 18.6	0 19.1	0 19.8	0 20.4	0 21.2	13	00
	10	0 14.1	0 14.4	0 14.7	0 15.1	0 15.5	0 16.0	0 16.5	0 17.1	0 17.7	12	50
	20	0 11.3	0 11.6	0 11.8	0 12.1	0 12.5	0 12.8	0 13.3	0 13.7	0 14.2		40
11	30	0 08.5	0 08.7	0 08.9	0 09.1	0 09.4	0 09.7	0 10.0	0 10.3	0 10.7	12	30
	40	0 05.7	0 05.8	0 05.9	0 06.1	0 06.3	0 06.4	0 06.7	0 06.9	0 07.1		20
	50	0 02.8	0 02.9	0 03.0	0 03.0	0 03.1	0 03.2	0 03.3	0 03.4	0 03.6		10
12	00	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	12	00

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.	
h m		° '	° '	° '	° '	° '	° '	° '	° '	° '	h m	
0	00	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	24	00
	10	0 03.7	0 03.9	0 04.0	0 04.2	0 04.5	0 04.7	0 05.0	0 05.2	0 05.3	23	50
	20	0 07.4	0 07.7	0 08.1	0 08.5	0 08.9	0 09.4	0 10.0	0 10.3	0 10.7		40
0	30	0 11.1	0 11.5	0 12.1	0 12.7	0 13.3	0 14.1	0 15.0	0 15.5	0 16.0	23	30
	40	0 14.7	0 15.4	0 16.1	0 16.8	0 17.7	0 18.7	0 19.9	0 20.6	0 21.3		20
	50	0 18.4	0 19.1	0 20.0	0 21.0	0 22.1	0 23.4	0 24.8	0 25.6	0 26.5		10
1	00	0 21.9	0 22.9	0 23.9	0 25.1	0 26.4	0 27.9	0 29.7	0 30.6	0 31.7	23	00

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1958

[For hour angles 0^h to 12^h Polaris is west of north, and for hour angles 12^h to 24^h it is east of north]

Lat. H. A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.	
h m		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m	
1	00	0 21.9	0 22.9	0 23.9	0 25.1	0 26.4	0 27.9	0 29.7	0 30.6	0 31.7	23	00
	10	0 25.5	0 26.6	0 27.8	0 29.1	0 30.7	0 32.4	0 34.5	0 35.6	0 36.8		50
	20	0 29.0	0 30.2	0 31.6	0 33.1	0 34.9	0 36.9	0 39.2	0 40.4	0 41.8		40
1	30	0 32.4	0 33.8	0 35.3	0 37.1	0 39.0	0 41.3	0 43.8	0 45.2	0 46.8	22	30
	40	0 35.8	0 37.3	0 39.0	0 40.9	0 43.1	0 45.5	0 48.4	0 49.9	0 51.6		20
	50	0 39.1	0 40.7	0 42.6	0 44.7	0 47.0	0 49.7	0 52.8	0 54.5	0 56.4		10
2	00	0 42.3	0 44.1	0 46.1	0 48.4	0 50.9	0 53.8	0 57.1	0 59.0	1 01.0	22	00
	10	0 45.5	0 47.4	0 49.5	0 51.9	0 54.7	0 57.8	1 01.4	1 03.3	1 05.5		50
	20	0 48.5	0 50.5	0 52.8	0 55.4	0 58.3	1 01.7	1 05.5	1 07.6	1 09.9		40
2	30	0 51.5	0 53.6	0 56.0	0 58.8	1 01.9	1 05.4	1 09.4	1 11.7	1 14.1	21	30
	40	0 54.3	0 56.6	0 59.1	1 02.0	1 05.3	1 09.0	1 13.2	1 15.6	1 18.2		20
	50	0 57.0	0 59.4	1 02.1	1 05.1	1 08.6	1 12.5	1 16.9	1 19.4	1 22.1		10
3	00	0 59.7	1 02.2	1 05.0	1 08.1	1 11.7	1 15.8	1 20.4	1 23.0	1 25.8	21	00
	10	1 02.2	1 04.8	1 07.7	1 11.0	1 14.7	1 18.9	1 23.8	1 26.5	1 29.4		50
	20	1 04.6	1 07.3	1 10.3	1 13.7	1 17.6	1 21.9	1 27.0	1 29.8	1 32.8		40
3	30	1 06.8	1 09.6	1 12.8	1 16.3	1 20.3	1 24.8	1 30.0	1 32.9	1 36.0	20	30
	40	1 09.0	1 11.8	1 15.1	1 18.7	1 22.8	1 27.5	1 32.8	1 35.8	1 39.0		20
	50	1 11.0	1 13.9	1 17.2	1 21.0	1 25.2	1 30.0	1 35.5	1 38.5	1 41.8		10
4	00	1 12.8	1 15.8	1 19.2	1 23.1	1 27.4	1 32.3	1 37.9	1 41.0	1 44.4	20	00
	10	1 14.5	1 17.6	1 21.1	1 25.0	1 29.4	1 34.4	1 40.2	1 43.4	1 46.8		50
	20	1 16.1	1 19.2	1 22.8	1 26.8	1 31.3	1 36.4	1 42.2	1 45.5	1 49.0		40
4	30	1 17.5	1 20.7	1 24.3	1 28.4	1 32.9	1 38.2	1 44.1	1 47.4	1 51.0	19	30
	40	1 18.8	1 22.0	1 25.7	1 29.8	1 34.4	1 39.7	1 45.8	1 49.1	1 52.7		20
	50	1 19.9	1 23.2	1 26.9	1 31.1	1 35.8	1 41.1	1 47.2	1 50.6	1 54.3		10
5	00	1 20.8	1 24.2	1 27.9	1 32.1	1 36.9	1 42.3	1 48.5	1 51.9	1 55.6	19	00
	10	1 21.7	1 25.0	1 28.8	1 33.0	1 37.8	1 43.3	1 49.5	1 53.0	1 56.7		50
	20	1 22.3	1 25.7	1 29.5	1 33.8	1 38.6	1 44.1	1 50.3	1 53.8	1 57.5		40
5	30	1 22.8	1 26.2	1 30.0	1 34.3	1 39.1	1 44.6	1 50.9	1 54.4	1 58.2	18	30
	40	1 23.1	1 26.5	1 30.4	1 34.7	1 39.5	1 45.0	1 51.3	1 54.8	1 58.6		20
	50	1 23.3	1 26.7	1 30.5	1 34.8	1 39.7	1 45.2	1 51.5	1 55.0	1 58.8		10
6	00	1 23.3	1 26.7	1 30.5	1 34.8	1 39.7	1 45.2	1 51.5	1 55.0	1 58.7	18	00
	10	1 23.2	1 26.6	1 30.4	1 34.6	1 39.5	1 45.0	1 51.2	1 54.7	1 58.4		50
	20	1 22.9	1 26.2	1 30.0	1 34.3	1 39.1	1 44.5	1 50.8	1 54.2	1 57.9		40
6	30	1 22.4	1 25.8	1 29.5	1 33.7	1 38.5	1 43.9	1 50.1	1 53.5	1 57.2	17	30
	40	1 21.8	1 25.1	1 28.8	1 33.0	1 37.8	1 43.1	1 49.2	1 52.6	1 56.3		20
	50	1 21.0	1 24.3	1 28.0	1 32.1	1 36.8	1 42.1	1 48.2	1 51.5	1 55.1		10
7	00	1 20.1	1 23.4	1 27.0	1 31.1	1 35.7	1 40.9	1 46.9	1 50.2	1 53.8	17	00
	10	1 19.0	1 22.2	1 25.8	1 29.8	1 34.4	1 39.5	1 45.4	1 48.7	1 52.2		50
	20	1 17.8	1 21.0	1 24.5	1 28.4	1 32.9	1 38.0	1 43.8	1 47.0	1 50.4		40
7	30	1 16.4	1 19.5	1 23.0	1 26.9	1 31.3	1 36.2	1 41.9	1 45.0	1 48.4	16	30
	40	1 14.9	1 18.0	1 21.3	1 25.1	1 29.4	1 34.3	1 39.8	1 42.9	1 46.2		20
	50	1 13.3	1 16.2	1 19.6	1 23.3	1 27.5	1 32.2	1 37.6	1 40.6	1 43.8		10
8	00	1 11.5	1 14.4	1 17.6	1 21.2	1 25.3	1 29.9	1 35.2	1 38.1	1 41.3	16	00
	10	1 09.6	1 12.4	1 15.5	1 19.0	1 23.0	1 27.5	1 32.6	1 35.5	1 38.5		50
	20	1 07.5	1 10.3	1 13.3	1 16.7	1 20.5	1 24.9	1 29.9	1 32.6	1 35.6		40
8	30	1 05.4	1 08.0	1 10.9	1 14.2	1 17.9	1 22.2	1 27.0	1 29.6	1 32.5	15	30
	40	1 03.1	1 05.6	1 08.5	1 11.6	1 15.2	1 19.3	1 23.9	1 26.5	1 29.2		20
	50	1 00.7	1 03.1	1 05.8	1 08.9	1 12.3	1 16.2	1 20.7	1 23.1	1 25.8		10
9	00	0 58.2	1 00.5	1 03.1	1 06.0	1 09.3	1 13.0	1 17.3	1 19.7	1 22.2	15	00
	10	0 55.6	0 57.8	1 00.3	1 03.0	1 06.2	1 09.7	1 13.8	1 16.0	1 18.5		50
	20	0 52.8	0 54.9	0 57.3	0 59.9	1 02.9	1 06.3	1 10.2	1 12.3	1 14.6		40
9	30	0 50.0	0 52.0	0 54.2	0 56.7	0 59.6	1 02.8	1 06.4	1 08.4	1 10.6	14	30
	40	0 47.1	0 49.0	0 51.1	0 53.4	0 56.1	0 59.1	1 02.5	1 04.4	1 06.5		20
	50	0 44.1	0 45.9	0 47.8	0 50.0	0 52.5	0 55.3	0 58.5	1 00.3	1 02.2		10
10 00		0 41.0	0 42.7	0 44.5	0 46.5	0 48.8	0 51.4	0 54.4	0 56.1	0 57.8	14 00	

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1958

[For hour angles 0^h to 12^h Polaris is west of north, and for hour angles 12^h to 24^h it is east of north]

Lat. H. A.	48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H. A.
^h ^m	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	^h ^m
10 00	0 41.0	0 42.7	0 44.5	0 46.5	0 48.8	0 51.4	0 54.4	0 56.1	0 57.8	14 00
10 10	0 37.9	0 39.4	0 41.1	0 42.9	0 45.1	0 47.5	0 50.2	0 51.8	0 53.4	13 50
10 20	0 34.6	0 36.0	0 37.6	0 39.3	0 41.2	0 43.4	0 46.0	0 47.3	0 48.8	13 40
10 30	0 31.4	0 32.6	0 34.0	0 35.6	0 37.3	0 39.3	0 41.6	0 42.8	0 44.2	13 30
10 40	0 28.0	0 29.1	0 30.4	0 31.8	0 33.3	0 35.1	0 37.2	0 38.3	0 39.5	13 20
10 50	0 24.6	0 25.6	0 26.7	0 27.9	0 29.3	0 30.9	0 32.7	0 33.6	0 34.7	13 10
11 00	0 21.2	0 22.0	0 23.0	0 24.0	0 25.2	0 26.6	0 28.1	0 28.9	0 29.9	13 00
11 10	0 17.7	0 18.4	0 19.2	0 20.1	0 21.1	0 22.2	0 23.5	0 24.2	0 25.0	12 50
11 20	0 14.2	0 14.8	0 15.4	0 16.1	0 16.9	0 17.8	0 18.8	0 19.4	0 20.0	12 40
11 30	0 10.7	0 11.1	0 11.6	0 12.1	0 12.7	0 13.4	0 14.2	0 14.6	0 15.0	12 30
11 40	0 07.1	0 07.4	0 07.7	0 08.1	0 08.5	0 08.9	0 09.5	0 09.7	0 10.0	12 20
11 50	0 03.6	0 03.7	0 03.9	0 04.0	0 04.2	0 04.5	0 04.7	0 04.9	0 05.0	12 10
12 00	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	12 00

Lat. H. A.	62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.
^h ^m	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	^h ^m
0 00	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	24 00
0 10	0 05.3	0 05.5	0 05.7	0 06.0	0 06.2	0 06.5	0 06.8	0 07.1	0 07.4	23 50
0 20	0 10.7	0 11.1	0 11.5	0 11.9	0 12.4	0 12.9	0 13.5	0 14.2	0 14.9	23 40
0 30	0 16.0	0 16.6	0 17.2	0 17.8	0 18.6	0 19.4	0 20.2	0 21.2	0 22.3	23 30
0 40	0 21.3	0 22.0	0 22.8	0 23.7	0 24.7	0 25.7	0 26.9	0 28.2	0 29.6	23 20
0 50	0 26.5	0 27.4	0 28.4	0 29.6	0 30.8	0 32.1	0 33.5	0 35.1	0 36.9	23 10
1 00	0 31.7	0 32.8	0 34.0	0 35.3	0 36.8	0 38.3	0 40.1	0 42.0	0 44.1	23 00
1 10	0 36.8	0 38.1	0 39.5	0 41.0	0 42.7	0 44.5	0 46.5	0 48.7	0 51.2	22 50
1 20	0 41.8	0 43.3	0 44.9	0 46.6	0 48.5	0 50.6	0 52.9	0 55.4	0 58.2	22 40
1 30	0 46.8	0 48.4	0 50.2	0 52.2	0 54.3	0 56.6	0 59.1	1 01.9	1 05.1	22 30
1 40	0 51.6	0 53.4	0 55.4	0 57.6	0 59.9	1 02.5	1 05.3	1 08.4	1 11.8	22 20
1 50	0 56.4	0 58.3	1 00.5	1 02.8	1 05.4	1 08.2	1 11.3	1 14.6	1 18.4	22 10
2 00	1 01.0	1 03.1	1 05.5	1 08.0	1 10.8	1 13.8	1 17.1	1 20.7	1 24.8	22 00
2 10	1 05.5	1 07.8	1 10.3	1 13.0	1 16.0	1 19.2	1 22.8	1 26.7	1 31.0	21 50
2 20	1 09.9	1 12.3	1 15.0	1 17.9	1 21.0	1 24.5	1 28.3	1 32.4	1 37.0	21 40
2 30	1 14.1	1 16.7	1 19.5	1 22.6	1 25.9	1 29.6	1 33.6	1 38.0	1 42.8	21 30
2 40	1 18.2	1 20.9	1 23.9	1 27.1	1 30.6	1 34.5	1 38.7	1 43.3	1 48.5	21 20
2 50	1 22.1	1 24.9	1 28.1	1 31.5	1 35.1	1 39.2	1 43.6	1 48.5	1 53.8	21 10
3 00	1 25.8	1 28.8	1 32.1	1 35.6	1 39.5	1 43.7	1 48.3	1 53.4	1 59.0	21 00
3 10	1 29.4	1 32.5	1 35.9	1 39.6	1 43.6	1 48.0	1 52.8	1 58.0	2 03.9	20 50
3 20	1 32.8	1 36.0	1 39.5	1 43.3	1 47.5	1 52.0	1 57.0	2 02.5	2 08.5	20 40
3 30	1 36.0	1 39.3	1 43.0	1 46.9	1 51.2	1 55.9	2 01.0	2 06.6	2 12.9	20 30
3 40	1 39.0	1 42.4	1 46.2	1 50.2	1 54.6	1 59.5	2 04.7	2 10.5	2 17.0	20 20
3 50	1 41.8	1 45.3	1 49.2	1 53.3	1 57.9	2 02.8	2 08.2	2 14.2	2 20.8	20 10
4 00	1 44.4	1 48.0	1 52.0	1 56.2	2 00.9	2 05.9	2 11.5	2 17.6	2 24.3	20 00
4 10	1 46.8	1 50.5	1 54.5	1 58.9	2 03.6	2 08.8	2 14.4	2 20.7	2 27.5	19 50
4 20	1 49.0	1 52.8	1 56.9	2 01.3	2 06.1	2 11.4	2 17.1	2 23.5	2 30.5	19 40
4 30	1 51.0	1 54.8	1 59.0	2 03.5	2 08.4	2 13.7	2 19.6	2 26.0	2 33.1	19 30
4 40	1 52.7	1 56.6	2 00.8	2 05.4	2 10.4	2 15.8	2 21.7	2 28.2	2 35.4	19 20
4 50	1 54.3	1 58.2	2 02.5	2 07.1	2 12.1	2 17.6	2 23.6	2 30.2	2 37.5	19 10
5 00	1 55.6	1 59.6	2 03.9	2 08.5	2 13.6	2 19.1	2 25.2	2 31.8	2 39.2	19 00
5 10	1 56.7	2 00.7	2 05.0	2 09.7	2 14.8	2 20.4	2 26.5	2 33.2	2 40.6	18 50
5 20	1 57.5	2 01.6	2 05.9	2 10.6	2 15.8	2 21.4	2 27.5	2 34.2	2 41.7	18 40
5 30	1 58.2	2 02.2	2 06.6	2 11.3	2 16.5	2 22.1	2 28.2	2 35.0	2 42.4	18 30
5 40	1 58.6	2 02.6	2 07.0	2 11.8	2 16.9	2 22.5	2 28.7	2 35.5	2 42.9	18 20
5 50	1 58.8	2 02.8	2 07.2	2 11.9	2 17.1	2 22.7	2 28.9	2 35.6	2 43.1	18 10
6 00	1 58.7	2 02.8	2 07.1	2 11.9	2 17.0	2 22.6	2 28.7	2 35.5	2 42.9	18 00

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1958 .

[For hour angles 0^h to 12^h Polaris is west of north, and for hour angles 12^h to 24^h it is east of north]

Lat. H. A.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.	
h m		° '	° '	° '	° '	° '	° '	° '	° '	° '	h m	
6 00	10	1 58.7	2 02.8	2 07.1	2 11.9	2 17.0	2 22.6	2 28.7	2 35.5	2 42.9	18 00	18 00
	20	1 58.4	2 02.5	2 06.8	2 11.5	2 16.7	2 22.2	2 28.3	2 35.0	2 42.4		17 50
	40	1 57.9	2 02.0	2 06.3	2 11.0	2 16.1	2 21.6	2 27.7	2 34.3	2 41.6		40
6 30	10	1 57.2	2 01.2	2 05.5	2 10.1	2 15.2	2 20.7	2 26.7	2 33.3	2 40.6	17 30	17 30
	20	1 56.3	2 00.2	2 04.5	2 09.1	2 14.1	2 19.5	2 25.5	2 32.0	2 39.2		20
	40	1 55.1	1 59.0	2 03.2	2 07.8	2 12.7	2 18.1	2 24.0	2 30.4	2 37.5		10
7 00	10	1 53.8	1 57.6	2 01.8	2 06.2	2 11.1	2 16.4	2 22.2	2 28.6	2 35.6	17 00	17 00
	20	1 52.2	1 56.0	2 00.1	2 04.5	2 09.3	2 14.5	2 20.2	2 26.4	2 33.3		16 50
	40	1 50.4	1 54.1	1 58.1	2 02.5	2 07.2	2 12.3	2 17.9	2 24.0	2 30.8		40
7 30	10	1 48.4	1 52.1	1 56.0	2 00.2	2 04.8	2 09.9	2 15.4	2 21.4	2 28.0	16 30	16 30
	20	1 46.2	1 49.8	1 53.6	1 57.8	2 02.3	2 07.2	2 12.6	2 18.5	2 24.9		20
	40	1 43.8	1 47.3	1 51.1	1 55.1	1 59.5	2 04.3	2 09.6	2 15.3	2 21.6		10
8 00	10	1 41.3	1 44.7	1 48.3	1 52.3	1 56.5	2 01.2	2 06.3	2 11.9	2 18.0	16 00	16 00
	20	1 38.5	1 41.8	1 45.4	1 49.2	1 53.4	1 57.9	2 02.8	2 08.2	2 14.2		15 50
	40	1 35.6	1 38.8	1 42.2	1 45.9	1 50.0	1 54.3	1 59.1	2 04.4	2 10.1		40
8 30	10	1 32.5	1 35.6	1 38.9	1 42.5	1 46.4	1 50.6	1 55.2	2 00.3	2 05.9	15 30	15 30
	20	1 29.2	1 32.2	1 35.4	1 38.8	1 42.6	1 46.7	1 51.1	1 56.0	2 01.4		20
	40	1 25.8	1 28.6	1 31.7	1 35.0	1 38.6	1 42.5	1 46.8	1 51.5	1 56.6		10
9 00	10	1 22.2	1 24.9	1 27.8	1 31.0	1 34.5	1 38.2	1 42.3	1 46.8	1 51.7	15 00	15 00
	20	1 18.5	1 21.1	1 23.9	1 26.9	1 30.2	1 33.7	1 37.6	1 41.9	1 46.6		14 50
	40	1 14.6	1 17.0	1 19.7	1 22.6	1 25.7	1 29.1	1 32.8	1 36.8	1 41.3		40
9 30	10	1 10.6	1 12.9	1 15.4	1 18.1	1 21.1	1 24.3	1 27.8	1 31.6	1 35.8	14 30	14 30
	20	1 06.5	1 08.6	1 11.0	1 13.6	1 16.3	1 19.3	1 22.6	1 26.2	1 30.2		20
	40	1 02.2	1 04.3	1 06.5	1 08.9	1 11.4	1 14.3	1 17.3	1 20.7	1 24.4		10
10 00	10	0 57.8	0 59.8	1 01.8	1 04.0	1 06.4	1 09.1	1 11.9	1 15.0	1 18.5	14 00	14 00
	20	0 53.4	0 55.1	0 57.0	0 59.1	1 01.3	1 03.7	1 06.4	1 09.2	1 12.4		13 50
	40	0 48.8	0 50.4	0 52.2	0 54.0	0 56.1	0 58.3	1 00.7	1 03.3	1 06.2		40
10 30	10	0 44.2	0 45.7	0 47.2	0 48.9	0 50.7	0 52.7	0 54.9	0 57.3	0 59.9	13 30	13 30
	20	0 39.5	0 40.8	0 42.2	0 43.7	0 45.3	0 47.1	0 49.1	0 51.2	0 53.5		20
	40	0 34.7	0 35.8	0 37.1	0 38.4	0 39.8	0 41.4	0 43.1	0 45.0	0 47.0		10
11 00	10	0 29.9	0 30.8	0 31.9	0 33.0	0 34.3	0 35.6	0 37.1	0 38.7	0 40.4	13 00	13 00
	20	0 25.0	0 25.8	0 26.7	0 27.6	0 28.7	0 29.8	0 31.0	0 32.3	0 33.8		12 50
	40	0 20.0	0 20.7	0 21.4	0 22.2	0 23.0	0 23.9	0 24.9	0 25.9	0 27.1		40
11 30	10	0 15.0	0 15.5	0 16.1	0 16.6	0 17.3	0 17.9	0 18.7	0 19.5	0 20.4	12 30	12 30
	20	0 10.0	0 10.4	0 10.7	0 11.1	0 11.5	0 12.0	0 12.5	0 13.0	0 13.6		20
	40	0 05.0	0 05.2	0 05.4	0 05.6	0 05.8	0 06.0	0 06.2	0 06.5	0 06.8		10
12 00	10	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00.0	12 00	12 00
	20											
	40											

TABLE IVa

Table IV has been computed for a declination of 89° 04' 15". For other declinations of Polaris the corrections given below should be applied to the Azimuth taken from table IV.

Azimuth Decl.		0'	20'	40'	60'	80'	100'	120'	140'	160'	180'	Azimuth Decl.	
° ' "		° '	° '	° '	° '	° '	° '	° '	° '	° '	° '	° ' "	
89 03 50	10	0.0	+0.1	+0.3	+0.4	+0.6	+0.7	+0.9	+1.0	+1.2	+1.3	89 03 50	10
	20	0.0	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1		20
	40	0.0	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8		40
89 04 05	10	0.0	+0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	89 04 05	10
	20	0.0	0.0	+0.1	+0.1	+0.1	+0.1	+0.2	+0.2	+0.2	+0.3		20
	40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		40
89 04 15	10	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	89 04 15	10
	20	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3		20
	40	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3		40
89 04 25	10	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.4	-0.4	-0.5	-0.5	89 04 25	10
	20	0.0	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8		20
	40	0.0	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1		40
89 04 35	10	0.0	-0.1	-0.3	-0.4	-0.6	-0.7	-0.9	-1.0	-1.2	-1.3	89 04 40	10
	20	0.0	-0.1	-0.3	-0.4	-0.6	-0.7	-0.9	-1.0	-1.2	-1.3		20
	40	0.0	-0.1	-0.3	-0.4	-0.6	-0.7	-0.9	-1.0	-1.2	-1.3		40

AZIMUTH OF POLARIS AT ELONGATION, 1958

Decl. Lat.							Variation for—	
	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	1" of Lat.	1" of δ
10 00	0 57 02.0	0 56 51.8	0 56 41.7	0 56 31.5	0 56 21.4	0 56 11.2	+0.17	-1.02
10 20	0 57 05.6	0 56 55.4	0 56 45.2	0 56 35.1	0 56 24.9	0 56 14.7	0.18	1.02
10 40	0 57 09.3	0 56 59.1	0 56 48.9	0 56 38.7	0 56 28.6	0 56 18.4	0.19	1.02
11 00	0 57 13.1	0 57 02.9	0 56 52.7	0 56 42.5	0 56 32.3	0 56 22.1	0.19	1.02
11 20	0 57 17.0	0 57 06.8	0 56 56.6	0 56 46.4	0 56 36.2	0 56 26.0	0.20	1.02
11 40	0 57 21.1	0 57 10.9	0 57 00.7	0 56 50.5	0 56 40.3	0 56 30.0	+0.20	-1.02
12 00	0 57 25.3	0 57 15.1	0 57 04.8	0 56 54.6	0 56 44.4	0 56 34.2	0.21	1.02
12 20	0 57 29.6	0 57 19.4	0 57 09.1	0 56 58.9	0 56 48.7	0 56 38.4	0.22	1.02
12 40	0 57 34.1	0 57 23.8	0 57 13.6	0 57 03.3	0 56 53.1	0 56 42.8	0.22	1.03
13 00	0 57 38.7	0 57 28.4	0 57 18.1	0 57 07.9	0 56 57.6	0 56 47.3	0.23	1.03
13 20	0 57 43.4	0 57 33.1	0 57 22.8	0 57 12.5	0 57 02.3	0 56 52.0	+0.24	-1.03
13 40	0 57 48.2	0 57 37.9	0 57 27.6	0 57 17.3	0 57 07.0	0 56 56.7	0.24	1.03
14 00	0 57 53.2	0 57 42.9	0 57 32.6	0 57 22.3	0 57 12.0	0 57 01.6	0.25	1.03
14 20	0 57 58.3	0 57 48.0	0 57 37.6	0 57 27.3	0 57 17.0	0 57 06.7	0.26	1.03
14 40	0 58 03.5	0 57 53.2	0 57 42.8	0 57 32.5	0 57 22.2	0 57 11.8	0.26	1.03
15 00	0 58 08.9	0 57 58.5	0 57 48.2	0 57 37.8	0 57 27.5	0 57 17.1	+0.27	-1.04
15 20	0 58 14.4	0 58 04.0	0 57 53.7	0 57 43.3	0 57 32.9	0 57 22.6	0.28	1.04
15 40	0 58 20.0	0 58 09.7	0 57 59.3	0 57 48.9	0 57 38.5	0 57 28.1	0.28	1.04
16 00	0 58 25.8	0 58 15.4	0 58 05.0	0 57 54.6	0 57 44.2	0 57 33.8	0.29	1.04
16 20	0 58 31.7	0 58 21.3	0 58 10.9	0 58 00.5	0 57 50.1	0 57 39.6	0.30	1.04
16 40	0 58 37.8	0 58 27.4	0 58 16.9	0 58 06.5	0 57 56.0	0 57 45.6	+0.30	-1.04
17 00	0 58 44.0	0 58 33.5	0 58 23.1	0 58 12.6	0 58 02.2	0 57 51.7	0.31	1.05
17 20	0 58 50.3	0 58 39.9	0 58 29.4	0 58 18.9	0 58 08.4	0 57 58.0	0.32	1.05
17 40	0 58 56.8	0 58 46.3	0 58 35.8	0 58 25.3	0 58 14.8	0 58 04.3	0.32	1.05
18 00	0 59 03.4	0 58 52.9	0 58 42.4	0 58 31.9	0 58 21.4	0 58 10.9	0.33	1.05
18 20	0 59 10.2	0 58 59.7	0 58 49.1	0 58 38.6	0 58 28.1	0 58 17.5	+0.34	-1.05
18 40	0 59 17.1	0 59 06.6	0 58 56.0	0 58 45.5	0 58 34.9	0 58 24.4	0.35	1.06
19 00	0 59 24.2	0 59 13.6	0 59 03.0	0 58 52.5	0 58 41.9	0 58 31.3	0.35	1.06
19 20	0 59 31.4	0 59 20.8	0 59 10.2	0 58 59.6	0 58 49.0	0 58 38.4	0.36	1.06
19 40	0 59 38.8	0 59 28.2	0 59 17.5	0 59 06.9	0 58 56.3	0 58 45.7	0.37	1.06
20 00	0 59 46.3	0 59 35.7	0 59 25.0	0 59 14.4	0 59 03.7	0 58 53.1	+0.38	-1.06
20 20	0 59 54.0	0 59 43.3	0 59 32.6	0 59 22.0	0 59 11.3	0 59 00.7	0.38	1.07
20 40	1 00 01.8	0 59 51.1	0 59 40.4	0 59 29.7	0 59 19.0	0 59 08.4	0.39	1.07
21 00	1 00 09.8	0 59 59.1	0 59 48.4	0 59 37.6	0 59 26.9	0 59 16.2	0.40	1.07
21 20	1 00 17.9	1 00 07.2	0 59 56.5	0 59 45.7	0 59 35.0	0 59 24.2	0.41	1.07
21 40	1 00 26.2	1 00 15.5	1 00 04.7	0 59 53.9	0 59 43.2	0 59 32.4	+0.42	-1.08
22 00	1 00 34.7	1 00 23.9	1 00 13.1	1 00 02.3	0 59 51.5	0 59 40.8	0.42	1.08
22 20	1 00 43.3	1 00 32.5	1 00 21.7	1 00 10.9	1 00 00.1	0 59 49.3	0.43	1.08
22 40	1 00 52.1	1 00 41.3	1 00 30.4	1 00 19.6	1 00 08.8	0 59 57.9	0.44	1.08
23 00	1 01 01.1	1 00 50.2	1 00 39.3	1 00 28.5	1 00 17.6	1 00 06.7	0.45	1.09
23 20	1 01 10.2	1 00 59.3	1 00 48.4	1 00 37.5	1 00 26.6	1 00 15.7	+0.46	-1.09
23 40	1 01 19.5	1 01 08.6	1 00 57.7	1 00 46.7	1 00 35.8	1 00 24.9	0.46	1.09
24 00	1 01 29.0	1 01 18.0	1 01 07.1	1 00 56.1	1 00 45.2	1 00 34.2	0.47	1.09
24 20	1 01 38.6	1 01 27.6	1 01 16.7	1 01 05.7	1 00 54.7	1 00 43.7	0.48	1.10
24 40	1 01 48.4	1 01 37.4	1 01 26.4	1 01 15.4	1 01 04.4	1 00 53.4	0.49	1.10
25 00	1 01 58.4	1 01 47.4	1 01 36.4	1 01 25.3	1 01 14.3	1 01 03.2	+0.50	-1.10
25 20	1 02 08.6	1 01 57.5	1 01 46.5	1 01 35.4	1 01 24.3	1 01 13.3	0.51	1.11
25 40	1 02 19.0	1 02 07.9	1 01 56.8	1 01 45.7	1 01 34.6	1 01 23.5	0.52	1.11
26 00	1 02 29.5	1 02 18.4	1 02 07.3	1 01 56.1	1 01 45.0	1 01 33.9	0.53	1.11
26 20	1 02 40.2	1 02 29.1	1 02 17.9	1 02 06.8	1 01 55.6	1 01 44.5	0.54	1.12
26 40	1 02 51.2	1 02 40.0	1 02 28.8	1 02 17.6	1 02 06.4	1 01 55.2	+0.55	-1.12
27 00	1 03 02.3	1 02 51.1	1 02 39.8	1 02 28.6	1 02 17.4	1 02 06.2	0.56	1.12
27 20	1 03 13.6	1 03 02.3	1 02 51.1	1 02 39.8	1 02 28.6	1 02 17.3	0.57	1.13
27 40	1 03 25.1	1 03 13.8	1 03 02.5	1 02 51.2	1 02 39.9	1 02 28.6	0.58	1.13
28 00	1 03 36.8	1 03 25.5	1 03 14.2	1 03 02.8	1 02 51.5	1 02 40.2	0.59	1.13
28 20	1 03 48.7	1 03 37.4	1 03 26.0	1 03 14.6	1 03 03.3	1 02 51.9	+0.60	-1.14
28 40	1 04 00.8	1 03 49.4	1 03 38.0	1 03 26.6	1 03 15.2	1 03 03.8	0.61	1.14
29 00	1 04 13.2	1 04 01.7	1 03 50.3	1 03 38.9	1 03 27.4	1 03 16.0	0.62	1.14
29 20	1 04 25.7	1 04 14.2	1 04 02.7	1 03 51.3	1 03 39.8	1 03 28.3	0.63	1.15
29 40	1 04 38.4	1 04 26.9	1 04 15.4	1 04 03.9	1 03 52.4	1 03 40.9	0.64	1.15
30 00	1 04 51.4	1 04 39.9	1 04 28.3	1 04 16.8	1 04 05.2	1 03 53.7	+0.65	-1.15

AZIMUTH OF POLARIS AT ELONGATION, 1958

Decl.							Variation for—	
	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	1' of Lat.	1'' of δ
Lat.								
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	"	"
30 00	1 04 51.4	1 04 39.9	1 04 28.3	1 04 16.8	1 04 05.2	1 03 53.7	+0.65	-1.15
30 10	1 04 58.0	1 04 46.4	1 04 34.8	1 04 23.3	1 04 11.7	1 04 00.1	0.65	1.16
30 20	1 05 04.6	1 04 53.0	1 04 41.4	1 04 29.8	1 04 18.2	1 04 06.6	0.66	1.16
30 30	1 05 11.3	1 04 59.6	1 04 48.0	1 04 36.4	1 04 24.8	1 04 13.2	0.66	1.16
30 40	1 05 18.0	1 05 06.4	1 04 54.7	1 04 43.1	1 04 31.5	1 04 19.9	0.67	1.16
30 50	1 05 24.8	1 05 13.1	1 05 01.5	1 04 49.8	1 04 38.2	1 04 26.5	+0.68	-1.16
31 00	1 05 31.6	1 05 20.0	1 05 08.3	1 04 56.6	1 04 45.0	1 04 33.3	0.68	1.17
31 10	1 05 38.5	1 05 26.8	1 05 15.1	1 05 03.5	1 04 51.8	1 04 40.1	0.69	1.17
31 20	1 05 45.5	1 05 33.8	1 05 22.1	1 05 10.4	1 04 58.6	1 04 46.9	0.69	1.17
31 30	1 05 52.5	1 05 40.8	1 05 29.0	1 05 17.3	1 05 05.6	1 04 53.9	0.70	1.17
31 40	1 05 59.6	1 05 47.8	1 05 36.1	1 05 24.3	1 05 12.6	1 05 00.8	+0.70	-1.18
31 50	1 06 06.7	1 05 54.9	1 05 43.2	1 05 31.4	1 05 19.6	1 05 07.9	0.71	1.18
32 00	1 06 13.9	1 06 02.1	1 05 50.3	1 05 38.5	1 05 26.7	1 05 14.9	0.72	1.18
32 10	1 06 21.2	1 06 09.3	1 05 57.5	1 05 45.7	1 05 33.9	1 05 22.1	0.72	1.18
32 20	1 06 28.5	1 06 16.6	1 06 04.8	1 05 53.0	1 05 41.1	1 05 29.3	0.73	1.18
32 30	1 06 35.8	1 06 24.0	1 06 12.1	1 06 00.3	1 05 48.4	1 05 36.6	+0.73	-1.19
32 40	1 06 43.3	1 06 31.4	1 06 19.5	1 06 07.6	1 05 55.8	1 05 43.9	0.74	1.19
32 50	1 06 50.8	1 06 38.9	1 06 27.0	1 06 15.1	1 06 03.2	1 05 51.3	0.75	1.19
33 00	1 06 58.3	1 06 46.4	1 06 34.5	1 06 22.6	1 06 10.6	1 05 58.7	0.75	1.19
33 10	1 07 06.0	1 06 54.0	1 06 42.1	1 06 30.1	1 06 18.2	1 06 06.2	0.76	1.19
33 20	1 07 13.6	1 07 01.7	1 06 49.7	1 06 37.7	1 06 25.8	1 06 13.8	+0.76	-1.20
33 30	1 07 21.4	1 07 09.4	1 06 57.4	1 06 45.4	1 06 33.4	1 06 21.4	0.77	1.20
33 40	1 07 29.2	1 07 17.2	1 07 05.2	1 06 53.2	1 06 41.1	1 06 29.1	0.78	1.20
33 50	1 07 37.1	1 07 25.1	1 07 13.0	1 07 01.0	1 06 48.9	1 06 36.9	0.78	1.20
34 00	1 07 45.0	1 07 33.0	1 07 20.9	1 07 08.8	1 06 56.8	1 06 44.7	0.79	1.21
34 10	1 07 53.0	1 07 41.0	1 07 28.9	1 07 16.8	1 07 04.7	1 06 52.6	+0.80	-1.21
34 20	1 08 01.1	1 07 49.0	1 07 36.9	1 07 24.8	1 07 12.7	1 07 00.6	0.80	1.21
34 30	1 08 09.3	1 07 57.1	1 07 45.0	1 07 32.9	1 07 20.7	1 07 08.6	0.81	1.21
34 40	1 08 17.5	1 08 05.3	1 07 53.2	1 07 41.0	1 07 28.8	1 07 16.7	0.82	1.22
34 50	1 08 25.8	1 08 13.6	1 08 01.4	1 07 49.2	1 07 37.0	1 07 24.8	0.82	1.22
35 00	1 08 34.1	1 08 21.9	1 08 09.7	1 07 57.5	1 07 45.3	1 07 33.1	+0.83	-1.22
35 10	1 08 42.5	1 08 30.3	1 08 18.0	1 08 05.8	1 07 53.6	1 07 41.3	0.84	1.22
35 20	1 08 51.0	1 08 38.7	1 08 26.5	1 08 14.2	1 08 02.0	1 07 49.7	0.84	1.23
35 30	1 08 59.6	1 08 47.3	1 08 35.0	1 08 22.7	1 08 10.4	1 07 58.1	0.85	1.23
35 40	1 09 08.2	1 08 55.9	1 08 43.6	1 08 31.3	1 08 18.9	1 08 06.6	0.86	1.23
35 50	1 09 16.9	1 09 04.5	1 08 52.2	1 08 39.9	1 08 27.5	1 08 15.2	+0.87	-1.23
36 00	1 09 25.6	1 09 13.3	1 09 00.9	1 08 48.6	1 08 36.2	1 08 23.8	0.87	1.24
36 10	1 09 34.5	1 09 22.1	1 09 09.7	1 08 57.3	1 08 44.9	1 08 32.5	0.88	1.24
36 20	1 09 43.4	1 09 31.0	1 09 18.6	1 09 06.2	1 08 53.7	1 08 41.3	0.89	1.24
36 30	1 09 52.4	1 09 39.9	1 09 27.5	1 09 15.1	1 09 02.6	1 08 50.2	0.89	1.24
36 40	1 10 01.5	1 09 49.0	1 09 36.5	1 09 24.0	1 09 11.6	1 08 59.1	+0.90	-1.25
36 50	1 10 10.6	1 09 58.1	1 09 45.6	1 09 33.1	1 09 20.6	1 09 08.1	0.91	1.25
37 00	1 10 19.8	1 10 07.3	1 09 54.8	1 09 42.2	1 09 29.7	1 09 17.2	0.92	1.25
37 10	1 10 29.1	1 10 16.5	1 10 04.0	1 09 51.4	1 09 38.9	1 09 26.3	0.92	1.26
37 20	1 10 38.5	1 10 25.9	1 10 13.3	1 10 00.7	1 09 48.1	1 09 35.6	0.93	1.26
37 30	1 10 47.9	1 10 35.3	1 10 22.7	1 10 10.1	1 09 57.5	1 09 44.9	+0.94	-1.26
37 40	1 10 57.4	1 10 44.8	1 10 32.2	1 10 19.5	1 10 06.9	1 09 54.3	0.95	1.26
37 50	1 11 07.0	1 10 54.4	1 10 41.7	1 10 29.0	1 10 16.4	1 10 03.7	0.96	1.27
38 00	1 11 16.7	1 11 04.0	1 10 51.3	1 10 38.6	1 10 25.9	1 10 13.3	0.96	1.27
38 10	1 11 26.5	1 11 13.7	1 11 01.0	1 10 48.3	1 10 35.6	1 10 22.9	0.97	1.27
38 20	1 11 36.3	1 11 23.6	1 11 10.8	1 10 58.1	1 10 45.3	1 10 32.6	+0.98	-1.27
38 30	1 11 46.2	1 11 33.5	1 11 20.7	1 11 07.9	1 10 55.1	1 10 42.3	0.99	1.28
38 40	1 11 56.2	1 11 43.4	1 11 30.6	1 11 17.8	1 11 05.0	1 10 52.2	1.00	1.28
38 50	1 12 06.3	1 11 53.5	1 11 40.7	1 11 27.8	1 11 15.0	1 11 02.1	1.00	1.28
39 00	1 12 16.5	1 12 03.6	1 11 50.8	1 11 37.9	1 11 25.0	1 11 12.2	1.01	1.29
39 10	1 12 26.8	1 12 13.9	1 12 01.0	1 11 48.1	1 11 35.2	1 11 22.3	+1.02	-1.29
39 20	1 12 37.1	1 12 24.2	1 12 11.3	1 11 58.3	1 11 45.4	1 11 32.5	1.03	1.29
39 30	1 12 47.5	1 12 34.6	1 12 21.6	1 12 08.7	1 11 55.7	1 11 42.7	1.04	1.30
39 40	1 12 58.1	1 12 45.1	1 12 32.1	1 12 19.1	1 12 06.1	1 11 53.1	1.05	1.30
39 50	1 13 08.7	1 12 55.6	1 12 42.6	1 12 29.6	1 12 16.6	1 12 03.5	1.06	1.30
40 00	1 13 19.4	1 13 06.3	1 12 53.2	1 12 40.2	1 12 27.1	1 12 14.1	+1.06	-1.31

AZIMUTH OF POLARIS AT ELONGATION, 1958

Decl. Lat.	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	Variation for—	
							1' of Lat.	1'' of δ
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	"	"
40 00	1 13 19.4	1 13 06.3	1 12 53.2	1 12 40.2	1 12 27.1	1 12 14.1	+1.06	-1.31
40 10	1 13 30.1	1 13 17.1	1 13 04.0	1 12 50.9	1 12 37.8	1 12 24.7	1.07	1.31
40 20	1 13 41.0	1 13 27.9	1 13 14.8	1 13 01.7	1 12 48.5	1 12 35.4	1.08	1.31
40 30	1 13 52.0	1 13 38.8	1 13 25.7	1 13 12.5	1 12 59.4	1 12 46.2	1.09	1.32
40 40	1 14 03.0	1 13 49.9	1 13 36.7	1 13 23.5	1 13 10.3	1 12 57.1	1.10	1.32
40 50	1 14 14.2	1 14 01.0	1 13 47.8	1 13 34.5	1 13 21.3	1 13 08.1	+1.11	-1.32
41 00	1 14 25.4	1 14 12.2	1 13 58.9	1 13 45.7	1 13 32.4	1 13 19.2	1.12	1.33
41 10	1 14 36.8	1 14 23.5	1 14 10.2	1 13 56.9	1 13 43.6	1 13 30.4	1.13	1.33
41 20	1 14 48.2	1 14 34.9	1 14 21.6	1 14 08.3	1 13 54.9	1 13 41.6	1.14	1.33
41 30	1 14 59.8	1 14 46.4	1 14 33.0	1 14 19.7	1 14 06.3	1 13 53.0	1.15	1.34
41 40	1 15 11.4	1 14 58.0	1 14 44.6	1 14 31.2	1 14 17.8	1 14 04.4	+1.16	-1.34
41 50	1 15 23.1	1 15 09.7	1 14 56.3	1 14 42.8	1 14 29.4	1 14 16.0	1.17	1.34
42 00	1 15 34.9	1 15 21.5	1 15 08.0	1 14 54.6	1 14 41.1	1 14 27.7	1.18	1.35
42 10	1 15 46.9	1 15 33.4	1 15 19.9	1 15 06.4	1 14 52.9	1 14 39.4	1.19	1.35
42 20	1 15 58.9	1 15 45.4	1 15 31.9	1 15 18.3	1 15 04.8	1 14 51.3	1.20	1.35
42 30	1 16 11.0	1 15 57.5	1 15 43.9	1 15 30.3	1 15 16.8	1 15 03.2	+1.21	-1.36
42 40	1 16 23.3	1 16 09.7	1 15 56.1	1 15 42.5	1 15 28.9	1 15 15.3	1.22	1.36
42 50	1 16 35.6	1 16 22.0	1 16 08.3	1 15 54.7	1 15 41.1	1 15 27.4	1.23	1.36
43 00	1 16 48.1	1 16 34.4	1 16 20.7	1 16 07.0	1 15 53.4	1 15 39.7	1.24	1.37
43 10	1 17 00.6	1 16 46.9	1 16 33.2	1 16 19.5	1 16 05.8	1 15 52.1	1.25	1.37
43 20	1 17 13.3	1 16 59.5	1 16 45.8	1 16 32.0	1 16 18.3	1 16 04.5	+1.26	-1.38
43 30	1 17 26.1	1 17 12.3	1 16 58.5	1 16 44.7	1 16 30.9	1 16 17.1	1.27	1.38
43 40	1 17 38.9	1 17 25.1	1 17 11.3	1 16 57.5	1 16 43.6	1 16 29.8	1.28	1.38
43 50	1 17 51.9	1 17 38.1	1 17 24.2	1 17 10.3	1 16 56.5	1 16 42.6	1.29	1.39
44 00	1 18 05.0	1 17 51.1	1 17 37.2	1 17 23.3	1 17 09.4	1 16 55.5	1.30	1.39
44 10	1 18 18.3	1 18 04.3	1 17 50.4	1 17 36.4	1 17 22.5	1 17 08.6	+1.32	-1.39
44 20	1 18 31.6	1 18 17.6	1 18 03.6	1 17 49.7	1 17 35.7	1 17 21.7	1.33	1.40
44 30	1 18 45.1	1 18 31.0	1 18 17.0	1 18 03.0	1 17 49.0	1 17 34.9	1.34	1.40
44 40	1 18 58.6	1 18 44.6	1 18 30.5	1 18 16.4	1 18 02.4	1 17 48.3	1.35	1.41
44 50	1 19 12.3	1 18 58.2	1 18 44.1	1 18 30.0	1 18 15.9	1 18 01.8	1.36	1.41
45 00	1 19 26.1	1 19 12.0	1 18 57.8	1 18 43.7	1 18 29.5	1 18 15.4	+1.37	-1.41
45 10	1 19 40.0	1 19 25.9	1 19 11.7	1 18 57.5	1 18 43.3	1 18 29.1	1.39	1.42
45 20	1 19 54.1	1 19 39.9	1 19 25.6	1 19 11.4	1 18 57.2	1 18 43.0	1.40	1.42
45 30	1 20 08.3	1 19 54.0	1 19 39.7	1 19 25.5	1 19 11.2	1 18 56.9	1.41	1.43
45 40	1 20 22.6	1 20 08.2	1 19 53.9	1 19 39.6	1 19 25.3	1 19 11.0	1.42	1.43
45 50	1 20 37.0	1 20 22.6	1 20 08.3	1 19 53.9	1 19 39.6	1 19 25.2	+1.44	-1.44
46 00	1 20 51.5	1 20 37.1	1 20 22.7	1 20 08.3	1 19 53.9	1 19 39.5	1.45	1.44
46 10	1 21 06.2	1 20 51.8	1 20 37.3	1 20 22.9	1 20 08.5	1 19 54.0	1.46	1.44
46 20	1 21 21.0	1 21 06.5	1 20 52.1	1 20 37.6	1 20 23.1	1 20 08.6	1.47	1.45
46 30	1 21 36.0	1 21 21.4	1 21 06.9	1 20 52.4	1 20 37.9	1 20 23.3	1.49	1.45
46 40	1 21 51.1	1 21 36.5	1 21 21.9	1 21 07.3	1 20 52.8	1 20 38.2	+1.50	-1.46
46 50	1 22 06.3	1 21 51.6	1 21 37.0	1 21 22.4	1 21 07.8	1 20 53.2	1.51	1.46
47 00	1 22 21.6	1 22 06.9	1 21 52.3	1 21 37.6	1 21 23.0	1 21 08.3	1.53	1.47
47 10	1 22 37.1	1 22 22.4	1 22 07.7	1 21 53.0	1 21 38.3	1 21 23.5	1.54	1.47
47 20	1 22 52.7	1 22 38.0	1 22 23.2	1 22 08.5	1 21 53.7	1 21 38.9	1.56	1.48
47 30	1 23 08.5	1 22 53.7	1 22 38.9	1 22 24.1	1 22 09.3	1 21 54.5	+1.57	-1.48
47 40	1 23 24.4	1 23 09.6	1 22 54.7	1 22 39.9	1 22 25.0	1 22 10.1	1.58	1.49
47 50	1 23 40.5	1 23 25.6	1 23 10.7	1 22 55.8	1 22 40.9	1 22 26.0	1.60	1.49
48 00	1 23 56.7	1 23 41.7	1 23 26.8	1 23 11.8	1 22 56.9	1 22 41.9	1.61	1.49
48 10	1 24 13.0	1 23 58.0	1 23 43.0	1 23 28.0	1 23 13.0	1 22 58.0	1.63	1.50
48 20	1 24 29.5	1 24 14.5	1 23 59.4	1 23 44.4	1 23 29.3	1 23 14.3	+1.64	-1.50
48 30	1 24 46.2	1 24 31.1	1 24 16.0	1 24 00.9	1 23 45.8	1 23 30.7	1.66	1.51
48 40	1 25 03.0	1 24 47.8	1 24 32.7	1 24 17.5	1 24 02.4	1 23 47.2	1.67	1.51
48 50	1 25 19.9	1 25 04.7	1 24 49.5	1 24 34.3	1 24 19.1	1 24 03.9	1.69	1.52
49 00	1 25 37.0	1 25 21.8	1 25 06.5	1 24 51.3	1 24 36.1	1 24 20.8	1.70	1.52
49 10	1 25 54.3	1 25 39.0	1 25 23.7	1 25 08.4	1 24 53.1	1 24 37.8	+1.72	-1.53
49 20	1 26 11.7	1 25 56.4	1 25 41.0	1 25 25.7	1 25 10.3	1 24 55.0	1.74	1.53
49 30	1 26 29.3	1 26 13.9	1 25 58.5	1 25 43.1	1 25 27.7	1 25 12.3	1.75	1.54
49 40	1 26 47.1	1 26 31.6	1 26 16.2	1 26 00.7	1 25 45.3	1 25 29.8	1.77	1.55
49 50	1 27 05.0	1 26 49.5	1 26 34.0	1 26 18.5	1 26 03.0	1 25 47.5	1.79	1.55
50 00	1 27 23.1	1 27 07.6	1 26 52.0	1 26 36.4	1 26 20.9	1 26 05.3	+1.80	-1.56

AZIMUTH OF POLARIS AT ELONGATION, 1958

Decl. Lat.	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	Variation for—	
							1' of Lat.	1'' of δ
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	"	"
50 00	1 27 23.1	1 27 07.6	1 26 52.0	1 26 36.4	1 26 20.9	1 26 05.3	+1.80	-1.56
50 10	1 27 41.4	1 27 25.8	1 27 10.2	1 26 54.5	1 26 38.9	1 26 23.3	1.82	1.56
50 20	1 27 59.8	1 27 44.2	1 27 28.5	1 27 12.8	1 26 57.1	1 26 41.5	1.84	1.57
50 30	1 28 18.4	1 28 02.7	1 27 47.0	1 27 31.3	1 27 15.5	1 26 59.8	1.85	1.57
50 40	1 28 37.2	1 28 21.4	1 28 05.7	1 27 49.9	1 27 34.1	1 27 18.3	1.87	1.58
50 50	1 28 56.2	1 28 40.4	1 28 24.5	1 28 08.7	1 27 52.9	1 27 37.0	+1.89	-1.58
51 00	1 29 15.3	1 28 59.5	1 28 43.6	1 28 27.7	1 28 11.8	1 27 55.9	1.91	1.59
51 10	1 29 34.7	1 29 18.7	1 29 02.8	1 28 46.8	1 28 30.9	1 28 14.9	1.93	1.60
51 20	1 29 54.2	1 29 38.2	1 29 22.2	1 29 06.2	1 28 50.2	1 28 34.2	1.94	1.60
51 30	1 30 13.9	1 29 57.8	1 29 41.8	1 29 25.7	1 29 09.6	1 28 53.6	1.96	1.61
51 40	1 30 33.8	1 30 17.7	1 30 01.6	1 29 45.4	1 29 29.3	1 29 13.2	+1.98	-1.61
51 50	1 30 53.9	1 30 37.7	1 30 21.5	1 30 05.3	1 29 49.2	1 29 33.0	2.00	1.62
52 00	1 31 14.2	1 30 57.9	1 30 41.7	1 30 25.4	1 30 09.2	1 29 53.0	2.02	1.62
52 10	1 31 34.7	1 31 18.4	1 31 02.1	1 30 45.8	1 30 29.4	1 30 13.1	2.04	1.63
52 20	1 31 55.4	1 31 39.0	1 31 22.6	1 31 06.3	1 30 49.9	1 30 33.5	2.06	1.64
52 30	1 32 16.2	1 31 59.8	1 31 43.4	1 31 27.0	1 31 10.5	1 30 54.1	+2.08	-1.64
52 40	1 32 37.3	1 32 20.9	1 32 04.4	1 31 47.9	1 31 31.4	1 31 14.9	2.10	1.65
52 50	1 32 58.6	1 32 42.1	1 32 25.5	1 32 09.0	1 31 52.4	1 31 35.9	2.12	1.66
53 00	1 33 20.2	1 33 03.5	1 32 46.9	1 32 30.3	1 32 13.7	1 31 57.1	2.14	1.66
53 10	1 33 41.9	1 33 25.2	1 33 08.5	1 32 51.8	1 32 35.2	1 32 18.5	2.16	1.67
53 20	1 34 03.8	1 33 47.1	1 33 30.3	1 33 13.6	1 32 56.8	1 32 40.1	+2.19	-1.68
53 30	1 34 26.0	1 34 09.2	1 33 52.4	1 33 35.6	1 33 18.7	1 33 01.9	2.21	1.68
53 40	1 34 48.4	1 34 31.5	1 34 14.6	1 33 57.8	1 33 40.9	1 33 24.0	2.23	1.69
53 50	1 35 11.0	1 34 54.1	1 34 37.1	1 34 20.2	1 34 03.2	1 33 46.3	2.25	1.69
54 00	1 35 33.9	1 35 16.9	1 34 59.8	1 34 42.8	1 34 25.8	1 34 08.8	2.28	1.70
54 10	1 35 56.9	1 35 39.9	1 35 22.8	1 35 05.7	1 34 48.6	1 34 31.5	+2.30	-1.71
54 20	1 36 20.3	1 36 03.1	1 35 46.0	1 35 28.8	1 35 11.6	1 34 54.5	2.32	1.72
54 30	1 36 43.8	1 36 26.6	1 36 09.4	1 35 52.1	1 35 34.9	1 35 17.7	2.35	1.72
54 40	1 37 07.6	1 36 50.3	1 36 33.0	1 36 15.7	1 35 58.4	1 35 41.1	2.37	1.73
54 50	1 37 31.7	1 37 14.3	1 36 56.9	1 36 39.6	1 36 22.2	1 36 04.8	2.39	1.74
55 00	1 37 55.9	1 37 38.5	1 37 21.1	1 37 03.6	1 36 46.2	1 36 28.8	+2.42	-1.74
55 10	1 38 20.5	1 38 03.0	1 37 45.5	1 37 28.0	1 37 10.4	1 36 52.9	2.45	1.75
55 20	1 38 45.3	1 38 27.7	1 38 10.1	1 37 52.5	1 37 34.9	1 37 17.4	2.47	1.76
55 30	1 39 10.4	1 38 52.7	1 38 35.0	1 38 17.4	1 37 59.7	1 37 42.1	2.50	1.77
55 40	1 39 35.7	1 39 17.9	1 39 00.2	1 38 42.5	1 38 24.7	1 38 07.0	2.52	1.77
55 50	1 40 01.3	1 39 43.5	1 39 25.6	1 39 07.8	1 38 50.0	1 38 32.2	+2.55	-1.78
56 00	1 40 27.1	1 40 09.2	1 39 51.4	1 39 33.5	1 39 15.6	1 38 57.7	2.58	1.79
56 10	1 40 53.3	1 40 35.3	1 40 17.3	1 39 59.4	1 39 41.4	1 39 23.4	2.60	1.80
56 20	1 41 19.7	1 41 01.6	1 40 43.6	1 40 25.6	1 40 07.5	1 39 49.5	2.63	1.80
56 30	1 41 46.4	1 41 28.3	1 41 10.1	1 40 52.0	1 40 33.9	1 40 15.8	2.66	1.81
56 40	1 42 13.4	1 41 55.2	1 41 37.0	1 41 18.8	1 41 00.6	1 40 42.4	+2.69	-1.82
56 50	1 42 40.7	1 42 22.4	1 42 04.1	1 41 45.8	1 41 27.5	1 41 09.2	2.72	1.83
57 00	1 43 08.2	1 42 49.9	1 42 31.5	1 42 13.1	1 41 54.8	1 41 36.4	2.75	1.84
57 10	1 43 36.1	1 43 17.7	1 42 59.2	1 42 40.8	1 42 22.3	1 42 03.9	2.78	1.84
57 20	1 44 04.3	1 43 45.8	1 43 27.2	1 43 08.7	1 42 50.2	1 42 31.6	2.81	1.85
57 30	1 44 32.8	1 44 14.2	1 43 55.6	1 43 36.9	1 43 18.3	1 42 59.7	+2.84	-1.86
57 40	1 45 01.6	1 44 42.9	1 44 24.2	1 44 05.5	1 43 46.8	1 43 28.1	2.87	1.87
57 50	1 45 30.7	1 45 11.9	1 44 53.2	1 44 34.4	1 44 15.6	1 43 56.8	2.90	1.88
58 00	1 46 00.2	1 45 41.3	1 45 22.4	1 45 03.6	1 44 44.7	1 44 25.8	2.94	1.89
58 10	1 46 30.0	1 46 11.0	1 45 52.0	1 45 33.1	1 45 14.1	1 44 55.1	2.97	1.90
58 20	1 47 00.1	1 46 41.0	1 46 22.0	1 46 02.9	1 45 43.9	1 45 24.8	+3.00	-1.91
58 30	1 47 30.5	1 47 11.4	1 46 52.3	1 46 33.1	1 46 14.0	1 45 54.8	3.04	1.91
58 40	1 48 01.3	1 47 42.1	1 47 22.9	1 47 03.6	1 46 44.4	1 46 25.2	3.07	1.92
58 50	1 48 32.5	1 48 13.2	1 47 53.8	1 47 34.5	1 47 15.2	1 46 55.9	3.11	1.93
59 00	1 49 04.0	1 48 44.6	1 48 25.2	1 48 05.7	1 47 46.3	1 47 26.9	3.14	1.94
59 10	1 49 35.9	1 49 16.4	1 48 56.9	1 48 37.3	1 48 17.8	1 47 58.3	+3.18	-1.95
59 20	1 50 08.1	1 49 48.5	1 49 28.9	1 49 09.3	1 48 49.7	1 48 30.1	3.21	1.96
59 30	1 50 40.7	1 50 21.0	1 50 01.3	1 49 41.6	1 49 21.9	1 49 02.2	3.25	1.97
59 40	1 51 13.7	1 50 53.9	1 50 34.1	1 50 14.3	1 49 54.5	1 49 34.7	3.29	1.98
59 50	1 51 47.1	1 51 27.2	1 51 07.3	1 50 47.4	1 50 27.5	1 50 07.6	3.33	1.99
60 00	1 52 20.9	1 52 00.9	1 51 40.9	1 51 20.9	1 51 00.9	1 50 40.9	+3.37	-2.00

AZIMUTH OF POLARIS AT ELONGATION, 1958

Lat.	Decl.	89° 03' 50''	89° 04' 00''	89° 04' 10''	89° 04' 20''	89° 04' 30''	89° 04' 40''	Variation for—	
								1' of Lat.	1'' of δ
	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	"	"
60 00	1 52 20.9	1 52 00.9	1 51 40.9	1 51 20.9	1 51 00.9	1 50 40.9	+3.37	-2.00	
60 10	1 52 55.1	1 52 35.0	1 52 14.9	1 51 54.7	1 51 34.6	1 51 14.5	3.41	2.01	
60 20	1 53 29.7	1 53 09.4	1 52 49.2	1 52 29.0	1 52 08.8	1 51 48.6	3.45	2.02	
60 30	1 54 04.7	1 53 44.3	1 53 24.0	1 53 03.7	1 52 43.4	1 52 23.1	3.49	2.03	
60 40	1 54 40.1	1 54 19.6	1 53 59.2	1 53 38.8	1 53 18.4	1 52 58.0	3.53	2.04	
60 50	1 55 15.9	1 54 55.4	1 54 34.9	1 54 14.3	1 53 53.8	1 53 33.3	+3.57	-2.05	
61 00	1 55 52.2	1 55 31.6	1 55 10.9	1 54 50.3	1 54 29.6	1 54 09.0	3.62	2.06	
61 10	1 56 28.9	1 56 08.2	1 55 47.4	1 55 26.7	1 55 05.9	1 54 45.2	3.66	2.07	
61 20	1 57 06.1	1 56 45.2	1 56 24.4	1 56 03.5	1 55 42.7	1 55 21.8	3.71	2.09	
61 30	1 57 43.7	1 57 22.7	1 57 01.8	1 56 40.8	1 56 19.8	1 55 58.9	3.75	2.10	
61 40	1 58 21.8	1 58 00.7	1 57 39.6	1 57 18.6	1 56 57.5	1 56 36.4	+3.80	-2.11	
61 50	1 59 00.4	1 58 39.2	1 58 18.0	1 57 56.8	1 57 35.6	1 57 14.4	3.85	2.12	
62 00	1 59 39.4	1 59 18.1	1 58 56.8	1 58 35.5	1 58 14.2	1 57 52.9	3.89	2.13	
62 10	2 00 19.0	1 59 57.5	1 59 36.1	1 59 14.7	1 58 53.2	1 58 31.8	3.94	2.14	
62 20	2 00 59.0	2 00 37.4	2 00 15.9	1 59 54.4	1 59 32.8	1 59 11.3	3.99	2.15	
62 30	2 01 39.5	2 01 17.9	2 00 56.2	2 00 34.5	2 00 12.9	1 59 51.2	+4.04	-2.17	
62 40	2 02 20.6	2 01 58.8	2 01 37.0	2 01 15.2	2 00 53.5	2 00 31.7	4.10	2.18	
62 50	2 03 02.2	2 02 40.3	2 02 18.4	2 01 56.5	2 01 34.6	2 01 12.6	4.15	2.19	
63 00	2 03 44.3	2 03 22.3	2 03 00.3	2 02 38.2	2 02 16.2	2 01 54.1	4.20	2.20	
63 10	2 04 27.0	2 04 04.8	2 03 42.7	2 03 20.5	2 02 58.4	2 02 36.2	4.26	2.22	
63 20	2 05 10.3	2 04 48.0	2 04 25.7	2 04 03.4	2 03 41.1	2 03 18.8	+4.31	-2.23	
63 30	2 05 54.1	2 05 31.6	2 05 09.2	2 04 46.8	2 04 24.4	2 04 01.9	4.37	2.24	
63 40	2 06 38.4	2 06 15.9	2 05 53.3	2 05 30.8	2 05 08.2	2 04 45.7	4.43	2.26	
63 50	2 07 23.4	2 07 00.7	2 06 38.0	2 06 15.3	2 05 52.7	2 05 30.0	4.49	2.27	
64 00	2 08 09.0	2 07 46.2	2 07 23.3	2 07 00.5	2 06 37.7	2 06 14.9	4.55	2.28	
64 10	2 08 55.2	2 08 32.2	2 08 09.3	2 07 46.3	2 07 23.3	2 07 00.4	+4.61	-2.30	
64 20	2 09 42.0	2 09 18.9	2 08 55.8	2 08 32.7	2 08 09.6	2 07 46.5	4.67	2.31	
64 30	2 10 29.4	2 10 06.2	2 09 43.0	2 09 19.7	2 08 56.5	2 08 33.2	4.73	2.32	
64 40	2 11 17.5	2 10 54.2	2 10 30.8	2 10 07.4	2 09 44.0	2 09 20.6	4.80	2.34	
64 50	2 12 06.3	2 11 42.8	2 11 19.2	2 10 55.7	2 10 32.2	2 10 08.6	4.87	2.35	
65 00	2 12 55.7	2 12 32.1	2 12 08.4	2 11 44.7	2 11 21.0	2 10 57.3	+4.93	-2.37	
65 10	2 13 45.9	2 13 22.0	2 12 58.2	2 12 34.4	2 12 10.6	2 11 46.7	5.00	2.38	
65 20	2 14 36.7	2 14 12.7	2 13 48.7	2 13 24.8	2 13 00.8	2 12 36.8	5.07	2.40	
65 30	2 15 28.2	2 15 04.1	2 14 40.0	2 14 15.8	2 13 51.7	2 13 27.6	5.14	2.41	
65 40	2 16 20.5	2 15 56.2	2 15 31.9	2 15 07.7	2 14 43.4	2 14 19.1	5.22	2.43	
65 50	2 17 13.5	2 16 49.1	2 16 24.6	2 16 00.2	2 15 35.8	2 15 11.3	+5.29	-2.44	
66 00	2 18 07.3	2 17 42.7	2 17 18.1	2 16 53.5	2 16 28.9	2 16 04.3	5.37	2.46	
66 10	2 19 01.9	2 18 37.1	2 18 12.4	2 17 47.6	2 17 22.8	2 16 58.1	5.45	2.48	
66 20	2 19 57.2	2 19 32.3	2 19 07.4	2 18 42.5	2 18 17.5	2 17 52.6	5.53	2.49	
66 30	2 20 53.4	2 20 28.3	2 20 03.2	2 19 38.1	2 19 13.0	2 18 47.9	5.61	2.51	
66 40	2 21 50.4	2 21 25.2	2 20 59.9	2 20 34.6	2 20 09.4	2 19 44.1	+5.69	-2.53	
66 50	2 22 48.3	2 22 22.8	2 21 57.4	2 21 32.0	2 21 06.5	2 20 41.1	5.78	2.54	
67 00	2 23 47.0	2 23 21.4	2 22 55.8	2 22 30.2	2 22 04.5	2 21 38.9	5.86	2.56	
67 10	2 24 46.6	2 24 20.8	2 23 55.0	2 23 29.2	2 23 03.4	2 22 37.6	5.95	2.58	
67 20	2 25 47.1	2 25 21.1	2 24 55.2	2 24 29.2	2 24 03.2	2 23 37.2	6.04	2.60	
67 30	2 26 48.5	2 26 22.4	2 25 56.2	2 25 30.1	2 25 03.9	2 24 37.8	+6.13	-2.62	
67 40	2 27 50.9	2 27 24.6	2 26 58.2	2 26 31.9	2 26 05.5	2 25 39.2	6.23	2.63	
67 50	2 28 54.2	2 28 27.7	2 28 01.2	2 27 34.7	2 27 08.1	2 26 41.6	6.33	2.65	
68 00	2 29 58.6	2 29 31.8	2 29 05.1	2 28 38.4	2 28 11.7	2 27 45.0	6.43	2.67	
68 10	2 31 03.9	2 30 37.0	2 30 10.1	2 29 43.2	2 29 16.3	2 28 49.3	6.53	2.69	
68 20	2 32 10.3	2 31 43.2	2 31 16.1	2 30 48.9	2 30 21.8	2 29 54.7	+6.63	-2.71	
68 30	2 33 17.7	2 32 50.4	2 32 23.1	2 31 55.8	2 31 28.5	2 31 01.2	6.74	2.73	
68 40	2 34 26.2	2 33 58.7	2 33 31.2	2 33 03.7	2 32 36.2	2 32 08.6	6.84	2.75	
68 50	2 35 35.8	2 35 08.1	2 34 40.4	2 34 12.7	2 33 45.0	2 33 17.2	6.96	2.77	
69 00	2 36 46.6	2 36 18.7	2 35 50.7	2 35 22.8	2 34 54.9	2 34 26.9	7.07	2.79	
69 10	2 37 58.5	2 37 30.4	2 37 02.2	2 36 34.1	2 36 05.9	2 35 37.8	+7.19	-2.81	
69 20	2 39 11.6	2 38 43.2	2 38 14.9	2 37 46.5	2 37 18.2	2 36 49.8	7.31	2.84	
69 30	2 40 25.9	2 39 57.4	2 39 28.8	2 39 00.2	2 38 31.6	2 38 03.0	7.43	2.86	
69 40	2 41 41.5	2 41 12.7	2 40 43.9	2 40 15.1	2 39 46.3	2 39 17.5	7.55	2.88	
69 50	2 42 58.4	2 42 29.3	2 42 00.3	2 41 31.3	2 41 02.2	2 40 33.2	7.68	2.90	
70 00	2 44 16.5	2 43 47.3	2 43 18.0	2 42 48.7	2 42 19.5	2 41 50.2	+7.81	-2.93	

FOR REDUCING TO ELONGATION OBSERVATIONS MADE NEAR ELONGATION

Azimuth at Elong.										Azimuth at Elong.	
Time		0° 50'	1° 0'	1° 10'	1° 20'	1° 30'	1° 40'	1° 50'	2° 0'		Time
m	"	"	"	"	"	"	"	"	"		m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0
1	0.0	0.0	0.0	0.0	0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1		1
2	+ 0.1	+ 0.1	+ 0.2	+ 0.2	0.2	0.2	0.2	0.3	0.3		2
3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6		3
4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.1		4
5	+ 0.7	+ 0.9	+ 1.0	+ 1.1	+ 1.3	+ 1.4	+ 1.6	+ 1.7			5
6	1.0	1.2	1.4	1.6	1.8	2.1	2.3	2.5			6
7	1.4	1.7	2.0	2.2	2.5	2.8	3.1	3.4			7
8	1.8	2.2	2.6	2.9	3.3	3.7	4.0	4.4			8
9	2.3	2.8	3.2	3.7	4.2	4.6	5.1	5.6			9
10	+ 2.9	+ 3.4	+ 4.0	+ 4.6	+ 5.1	+ 5.7	+ 6.3	+ 6.9			10
11	3.5	4.1	4.8	5.5	6.2	6.9	7.6	8.3			11
12	4.1	4.9	5.8	6.6	7.4	8.2	9.0	9.9			12
13	4.8	5.8	6.8	7.7	8.7	9.7	10.6	11.6			13
14	5.6	6.7	7.8	9.0	10.1	11.2	12.3	13.4			14
15	+ 6.4	+ 7.7	+ 9.0	+10.3	+11.6	+12.8	+14.1	+15.4			15
16	7.3	8.8	10.2	11.7	13.2	14.6	16.1	17.5			16
17	8.2	9.9	11.5	13.2	14.9	16.5	18.2	19.8			17
18	9.2	11.1	12.9	14.8	16.7	18.5	20.4	22.2			18
19	10.3	12.4	14.4	16.5	18.6	20.6	22.7	24.7			19
20	+11.4	+13.7	+16.0	+18.3	+20.6	+22.8	+25.1	+27.4			20
21	12.6	15.1	17.6	20.1	22.7	25.2	27.7	30.2			21
22	13.8	16.6	19.3	22.1	24.9	27.6	30.4	33.2			22
23	15.1	18.1	21.1	24.2	27.2	30.2	33.2	36.2			23
24	16.4	19.7	23.0	26.3	29.6	32.9	36.2	39.5			24
25	+17.8	+21.4	+25.0	+28.5	+32.1	+35.7	+39.2	+42.8			25

Azimuth at Elong.										Azimuth at Elong.	
Time		2° 0'	2° 10'	2° 20'	2° 30'	2° 40'	2° 50'	3° 0'	3° 10'		Time
m	"	"	"	"	"	"	"	"	"		m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0
1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1		1
2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4		2
3	0.6	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.0		3
4	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7			4
5	+ 1.7	+ 1.9	+ 2.0	+ 2.1	+ 2.3	+ 2.4	+ 2.6	+ 2.7			5
6	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9			6
7	3.4	3.7	3.9	4.2	4.5	4.8	5.0	5.3			7
8	4.4	4.8	5.1	5.5	5.9	6.2	6.6	7.0			8
9	5.6	6.0	6.5	7.0	7.4	7.9	8.3	8.8			9
10	+ 6.9	+ 7.4	+ 8.0	+ 8.6	+ 9.2	+ 9.7	+10.3	+10.9			10
11	8.3	9.0	9.7	10.4	11.1	11.8	12.4	13.1			11
12	9.9	10.7	11.5	12.3	13.2	14.0	14.8	15.6			12
13	11.6	12.6	13.5	14.5	15.4	16.4	17.4	18.4			13
14	13.4	14.6	15.7	16.8	17.9	19.0	20.2	21.3			14
15	+15.4	+16.7	+18.0	+19.3	+20.6	+21.9	+23.1	+24.4			15
16	17.5	19.0	20.5	21.9	23.4	24.9	26.3	27.8			16
17	19.8	21.5	23.1	24.8	26.4	28.1	29.7	31.4			17
18	22.2	24.1	25.9	27.8	29.6	31.5	33.3	35.2			18
19	24.7	26.8	28.9	30.9	33.0	35.1	37.1	39.2			19
20	+27.4	+29.7	+32.0	+34.3	+36.6	+38.8	+41.1	+43.4			20
21	30.2	32.7	35.2	37.8	40.3	42.8	45.3	47.9			21
22	33.2	35.9	38.7	41.5	44.2	47.0	49.8	52.5			22
23	36.2	39.3	42.3	45.3	48.3	51.4	54.4	57.4			23
24	39.5	42.8	46.0	49.3	52.6	55.9	59.2	62.5			24
25	+42.8	+46.4	+49.9	+53.5	+57.1	+60.7	+64.2	+67.8			25

*Sidereal time from elongation.

FOR FINDING, BY OBSERVATION, WHEN POLARIS PASSES THE
MERIDIAN, 1958

The mean time interval which elapses from the instant when Polaris is vertically above or below either ζ^1 Ursæ Majoris (Mizar) or δ Cassiopeiæ, as the case may be, to the instant when Polaris passes the meridian, is given in the following table:

ζ^1 URSÆ MAJORIS (MIZAR) (Above Polaris, L. C.)							δ CASSIOPEIÆ (Below Polaris, L. C.)						
U. T.	Lat.	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
		m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s
Jan.	21.2	31 54	31 57	32 00	32 03	32 06	32 09	33 03	33 07	33 12	33 18	33 26	33 36
	31.2	31 41	31 44	31 47	31 49	31 53	31 56	32 50	32 54	32 59	33 05	33 12	33 22
Feb.	10.2	31 28	31 31	31 33	31 36	31 40	31 43	32 37	32 41	32 46	32 52	32 59	33 09
	20.2	31 16	31 18	31 21	31 24	31 27	31 31	32 24	32 29	32 34	32 39	32 47	32 56
Mar.	2.1	31 05	31 08	31 10	31 13	31 16	31 20	32 13	32 18	32 23	32 29	32 36	32 45
	12.1	30 56	30 58	31 01	31 04	31 07	31 10	32 04	32 08	32 13	32 19	32 27	32 36
	22.1	30 49	30 51	30 54	30 57	31 00	31 03	31 57	32 01	32 06	32 12	32 20	32 29
Apr.	1.0	30 44	30 47	30 49	30 52	30 55	30 59	31 53	31 57	32 02	32 08	32 15	32 24
	11.0	30 42	30 44	30 47	30 50	30 53	30 56	31 50	31 54	31 59	32 05	32 12	32 22
	20.9	30 42	30 45	30 47	30 50	30 53	30 57	31 50	31 55	32 00	32 06	32 13	32 22
	30.9	30 45	30 47	30 50	30 53	30 56	30 59	31 53	31 58	32 02	32 08	32 16	32 25
May	10.9	30 50	30 52	30 55	30 58	31 01	31 04	31 58	32 03	32 08	32 14	32 21	32 30
	20.9	30 57	31 00	31 02	31 05	31 08	31 12	32 06	32 10	32 15	32 21	32 28	32 38
	30.9	31 06	31 09	31 12	31 14	31 18	31 21	32 15	32 19	32 24	32 30	32 37	32 47
June	9.9	31 17	31 19	31 22	31 25	31 28	31 32	32 25	32 30	32 35	32 41	32 48	32 58
	19.8	31 29	31 31	31 34	31 37	31 40	31 44	32 37	32 42	32 47	32 53	33 00	33 10
	29.8	31 42	31 44	31 47	31 50	31 53	31 57	32 50	32 55	33 00	33 06	33 13	33 23
July	9.8	31 55	31 58	32 01	32 04	32 07	32 10	33 04	33 08	33 13	33 19	33 27	33 37

δ CASSIOPEIÆ (Above Polaris, U. C.)							ζ^1 URSÆ MAJORIS (MIZAR) (Below Polaris, U. C.)						
U. T.	Lat.	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
		m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s
Jan.	0.8	33 04	33 01	32 58	32 55	32 52	32 48	32 44	31 52	31 47	31 41	31 33	31 24
	10.8	32 52	32 49	32 46	32 43	32 40	32 36	32 32	31 39	31 34	31 28	31 21	31 12
	20.7	32 39	32 36	32 33	32 30	32 27	32 23	32 19	31 27	31 22	31 16	31 08	30 59
	30.7	32 26	32 23	32 20	32 17	32 14	32 10	32 06	31 13	31 08	31 03	30 55	30 46
	...	...	...	...	...	...	...	...	...	...	...	...	...
July	19.3	32 52	32 49	32 46	32 43	32 39	32 36	32 32	31 39	31 34	31 28	31 21	31 11
	29.2	33 05	33 02	32 59	32 56	32 53	32 49	32 45	31 53	31 48	31 42	31 34	31 25
Aug.	8.2	33 18	33 16	33 13	33 09	33 06	33 03	32 59	32 06	32 01	31 55	31 47	31 38
	18.2	33 31	33 28	33 25	33 22	33 19	33 15	33 11	32 19	32 13	32 07	32 00	31 50
	28.1	33 43	33 40	33 37	33 34	33 31	33 27	33 23	32 30	32 25	32 19	32 11	32 02
Sept.	7.1	33 54	33 51	33 48	33 45	33 41	33 38	33 33	32 41	32 36	32 30	32 22	32 12
	17.1	34 03	34 00	33 57	33 54	33 51	33 47	33 43	32 51	32 45	32 39	32 31	32 22
	27.1	34 11	34 08	34 05	34 02	33 58	33 55	33 51	32 58	32 53	32 47	32 39	32 29
Oct.	7.0	34 17	34 14	34 11	34 08	34 05	34 01	33 57	33 04	32 59	32 53	32 45	32 35
	17.0	34 21	34 18	34 15	34 12	34 09	34 05	34 01	33 09	33 04	32 57	32 50	32 40
	26.9	34 24	34 21	34 18	34 15	34 11	34 07	34 03	33 11	33 06	33 00	32 52	32 42
Nov.	5.9	34 24	34 21	34 18	34 15	34 11	34 08	34 03	33 11	33 06	33 00	32 52	32 42
	15.9	34 22	34 19	34 16	34 13	34 09	34 05	34 01	33 09	33 04	32 58	32 50	32 40
	25.9	34 17	34 14	34 11	34 08	34 05	34 01	33 57	33 05	32 59	32 53	32 46	32 36
Dec.	5.9	34 11	34 08	34 05	34 02	33 59	33 55	33 51	32 58	32 53	32 47	32 39	32 30
	15.8	34 03	34 00	33 57	33 53	33 50	33 46	33 42	32 50	32 45	32 39	32 31	32 21
	25.8	33 52	33 49	33 46	33 43	33 40	33 36	33 32	32 40	32 35	32 28	32 21	32 11
	35.8	33 41	33 38	33 35	33 32	33 28	33 25	33 21	32 28	32 23	32 17	32 09	32 00

APPARENT PLACE, TIME OF UPPER CULMINATION, AND TIME INTERVAL BETWEEN UPPER CULMINATION AND ELONGATION EAST OR WEST, OF POLARIS, 1958

The local civil time of culmination on any meridian for a given date is found by taking from the following table the *Civil Time* of the nearest Greenwich culmination and reducing it to the given date by means of the *Var. per Day*, and to the longitude of the given meridian by means of the *Var. per Hour*.

The time interval between upper and lower culmination is 12^h diminished by one-half the numerical value of the *Var. per Day*.

The last column below applies to all meridians.

Civil Time		Upper Culmination, Meridian of Greenwich				Latitude	Mean Time Interval, Elongation minus Upper Culm.
		Apparent Right Ascension	Apparent Declination	Civil Time	Var. per Day	Var. per Hour	
		h m 1 53	° ' +89 03				
		s "		h m s	m s	W. E. s	° W. E. h m
Jan.	0.8	142	84.7	19 15 35	-3 57.1	-9.88+	10 +5 58.4-
	10.8	129	86.0	18 36 04	3 57.2	9.88	12 5 58.2
	20.7	116	86.7	17 56 31	3 57.2	9.88	14 5 58.1
	30.7	103	86.7	17 16 59	3 57.2	9.88	16 5 58.0
Feb.	9.7	90	86.1	16 37 27	3 57.2	9.88	18 5 57.8
Mar.	19.7	78	84.8	15 57 56	-3 57.1	-9.88+	20 +5 57.7-
	1.6	67	82.9	15 18 26	3 56.9	9.87	22 5 57.5
	11.6	58	80.6	14 38 58	3 56.7	9.86	24 5 57.4
	21.6	51	77.9	13 59 32	3 56.5	9.85	26 5 57.2
	31.6	46	74.9	13 20 08	3 56.3	9.84	28 5 57.0
Apr.	10.5	44	71.8	12 40 46	-3 56.0	-9.83+	30 +5 56.9-
	20.5	44	68.6	12 01 28	3 55.8	9.82	32 5 56.7
	30.5	47	65.6	11 22 11	3 55.5	9.81	34 5 56.5
May	10.4	52	62.7	10 42 57	3 55.3	9.80	36 5 56.3
	20.4	59	60.1	10 03 45	3 55.1	9.80	38 5 56.1
June	30.4	68	57.8	9 24 35	-3 54.9	-9.79+	40 +5 55.9-
	9.4	79	56.0	8 45 27	3 54.8	9.78	42 5 55.7
	19.3	91	54.7	8 06 19	3 54.7	9.78	44 5 55.4
	29.3	104	53.9	7 27 13	3 54.6	9.77	46 5 55.2
July	9.3	117	53.7	6 48 08	3 54.5	9.77	48 5 54.9
Aug.	19.3	131	54.0	6 09 02	-3 54.5	-9.77+	50 +5 54.6-
	29.2	145	54.7	5 29 57	3 54.5	9.77	52 5 54.3
	8.2	158	56.1	4 50 51	3 54.6	9.77	54 5 53.9
	18.2	171	57.8	4 11 45	3 54.7	9.78	56 5 53.5
	28.1	183	60.1	3 32 38	3 54.8	9.78	58 5 53.1
Sept.	7.1	194	62.7	2 53 30	-3 54.9	-9.79+	60 +5 52.6-
	17.1	203	65.7	2 14 20	3 55.0	9.79	62 5 52.0
	27.1	211	69.0	1 35 09	3 55.2	9.80	64 5 51.4
Oct.	7.0	218	72.4	0 55 56	3 55.4	9.81	66 5 50.7
	17.0	222	76.1	0 16 42	3 55.6	9.82	68 5 49.8
Nov.	26.9	224	79.8	23 37 25	-3 55.8	-9.82+	70 +5 48.8-
	5.9	224	83.5	22 58 06	3 56.0	9.83	
	15.9	222	87.1	22 18 45	3 56.2	9.84	
	25.9	218	90.5	21 39 21	3 56.4	9.85	
Dec.	5.9	212	93.6	20 59 56	3 56.7	9.86	
	15.8	203	96.3	20 20 28	-3 56.8	-9.87+	
	25.8	193	98.6	19 40 59	3 57.0	9.88	
	35.8	181	100.3	19 01 28	-3 57.1	-9.88+	

CONSTANTS FOR THE REDUCTION OF THE MEAN PLACES OF STARS FROM
THE EQUINOX OF t_0 TO THAT OF $t=1958.0$

Let α_0, δ_0 , represent the coordinates of a star referred to the equinox of t_0 ; α, δ , the coordinates referred to the equinox of $t=1958.0$; and α', δ' , the approximate values of the coordinates referred to the equinox of $t_0 + \frac{1}{2} \tau$, where $\tau = t - t_0$. Then α, δ , are computed by means of formulas (1) or (2) in connection with the constants tabulated below. For stars of high declinations formulas (1) should be used.

$$\left. \begin{aligned} a_0 &= \alpha_0 + \zeta_0 \\ p &= \sin \theta (\tan \delta_0 + \tan \frac{1}{2} \theta \cos a_0) \\ \tan (a - a_0) &= \frac{p \sin a_0}{1 - p \cos a_0} \\ \alpha &= a + z \\ \tan \frac{1}{2} (\delta - \delta_0) &= \cos \frac{1}{2} (a + a_0) \sec \frac{1}{2} (a - a_0) \tan \frac{1}{2} \theta \\ \alpha &= \alpha_0 + \tau m^s + \tau n^s \sin \alpha' \tan \delta' \\ \delta &= \delta_0 + \tau n'' \cos \alpha' \end{aligned} \right\} (1)$$

$$\left. \begin{aligned} \alpha &= \alpha_0 + \tau m^s + \tau n^s \sin \alpha' \tan \delta' \\ \delta &= \delta_0 + \tau n'' \cos \alpha' \end{aligned} \right\} (2)$$

t_0	ζ_0	z	θ	t_0	τm^s	Log (τn^s)	Log ($\tau n''$)
	' "	' "	' "		m s		
1755	+77 54.92	+77 58.18	+67 49.91	1755	+10 23.519	2.433523	3.609614
1790	64 29.50	64 31.74	56 08.04	1790	8 36.071	2.351307	3.527398
1800	60 39.34	60 41.31	52 47.52	1800	8 05.367	2.324646	3.500737
1810	56 49.15	56 50.89	49 27.00	1810	7 34.661	2.296242	3.472333
1825	51 03.84	51 05.24	44 26.23	1825	6 48.599	2.249819	3.425910
1830	+49 08.72	+49 10.02	+42 45.97	1830	+ 6 33.244	2.233173	3.409264
1835	47 13.60	47 14.80	41 05.72	1835	6 17.889	2.215864	3.391955
1840	45 18.48	45 19.58	39 25.47	1840	6 02.533	2.197837	3.373928
1845	43 23.35	43 24.36	37 45.22	1845	5 47.177	2.179029	3.355120
1850	41 28.21	41 29.14	36 04.97	1850	5 31.820	2.159370	3.335461
1855	+39 33.07	+39 33.91	+34 24.72	1855	+ 5 16.462	2.138779	3.314870
1860	37 37.93	37 38.69	32 44.47	1860	5 01.105	2.117164	3.293255
1865	35 42.77	35 43.46	31 04.23	1865	4 45.747	2.094417	3.270508
1870	33 47.62	33 48.23	29 23.99	1870	4 30.388	2.070412	3.246503
1875	31 52.46	31 53.00	27 43.75	1875	4 15.029	2.045003	3.221094
1880	+29 57.29	+29 57.77	+26 03.51	1880	+ 3 59.670	2.018015	3.194106
1885	28 02.12	28 02.54	24 23.27	1885	3 44.310	1.989240	3.165331
1890	26 06.94	26 07.31	22 43.03	1890	3 28.949	1.958421	3.134512
1895	24 11.76	24 12.07	21 02.80	1895	3 13.588	1.925249	3.101340
1900	22 16.57	22 16.84	19 22.56	1900	2 58.227	1.889332	3.065423
1905	+20 21.38	+20 21.60	+17 42.33	1905	+ 2 42.865	1.850176	3.026267
1910	18 26.18	18 26.36	16 02.10	1910	2 27.502	1.807137	2.983228
1915	16 30.97	16 31.12	14 21.88	1915	2 12.140	1.759360	2.935451
1920	14 35.77	14 35.88	12 41.65	1920	1 56.776	1.705671	2.881762
1925	12 40.55	12 40.64	11 01.43	1925	1 41.413	1.644397	2.820488
1930	+10 45.33	+10 45.39	+ 9 21.20	1930	+ 1 26.048	1.573036	2.749127
1935	8 50.11	8 50.15	7 40.98	1935	1 10.684	1.487602	2.663693
1940	6 54.88	6 54.90	6 00.77	1940	0 55.318	1.381142	2.557233
1945	4 59.64	4 59.65	4 20.55	1945	0 39.953	1.239809	2.415900
1950	3 04.40	3 04.40	2 40.34	1950	0 24.587	1.028951	2.205042
1955	+ 1 09.15	+ 1 09.15	+ 1 00.13	1955	+ 0 09.220	0.602978	1.779069

JULIAN DAY NUMBER

DAYS ELAPSED AT GREENWICH MEAN NOON OF JANUARY 0

For A. D. 0 to A. D. 1580 inclusive, the Julian Day Numbers in this table are for January 0 of the Julian Calendar in each leap year.

For 1584 to 2096 inclusive, they are for January 0 of the Gregorian Calendar, except that in 1700, 1800, and 1900, which were not leap years, they are for January -1.

Table IXA is a more extended table for 1900 to 2019 inclusive.

A. D.	0	100	200	300	400	500	600	700	800	900
0	172 1057	175 7582	179 4107	183 0632	186 7157	190 3682	194 0207	197 6732	201 3257	204 9782
4	172 2518	175 9043	179 5568	183 2093	186 8618	190 5143	194 1668	197 8193	201 4718	205 1243
8	172 3979	176 0504	179 7029	183 3554	187 0079	190 6604	194 3129	197 9654	201 6179	205 2704
12	172 5440	176 1965	179 8490	183 5015	187 1540	190 8065	194 4590	198 1115	201 7640	205 4165
16	172 6901	176 3426	179 9951	183 6476	187 3001	190 9526	194 6051	198 2576	201 9101	205 5626
20	172 8362	176 4887	180 1412	183 7937	187 4462	191 0987	194 7512	198 4037	202 0562	205 7087
24	172 9823	176 6348	180 2873	183 9398	187 5923	191 2448	194 8973	198 5498	202 2023	205 8548
28	173 1284	176 7809	180 4334	184 0859	187 7384	191 3909	195 0434	198 6959	202 3484	206 0009
32	173 2745	176 9270	180 5795	184 2320	187 8845	191 5370	195 1895	198 8420	202 4945	206 1470
36	173 4206	177 0731	180 7256	184 3781	188 0306	191 6831	195 3356	198 9881	202 6406	206 2931
40	173 5667	177 2192	180 8717	184 5242	188 1767	191 8292	195 4817	199 1342	202 7867	206 4392
44	173 7128	177 3653	181 0178	184 6703	188 3228	191 9753	195 6278	199 2803	202 9328	206 5853
48	173 8589	177 5114	181 1639	184 8164	188 4689	192 1214	195 7739	199 4264	203 0789	206 7314
52	174 0050	177 6575	181 3100	184 9625	188 6150	192 2675	195 9200	199 5725	203 2250	206 8775
56	174 1511	177 8036	181 4561	185 1086	188 7611	192 4136	196 0661	199 7186	203 3711	207 0236
60	174 2972	177 9497	181 6022	185 2547	188 9072	192 5597	196 2122	199 8647	203 5172	207 1697
64	174 4433	178 0958	181 7483	185 4008	189 0533	192 7058	196 3583	200 0108	203 6633	207 3158
68	174 5894	178 2419	181 8944	185 5469	189 1994	192 8519	196 5044	200 1569	203 8094	207 4619
72	174 7355	178 3880	182 0405	185 6930	189 3455	192 9980	196 6505	200 3030	203 9555	207 6080
76	174 8816	178 5341	182 1866	185 8391	189 4916	193 1441	196 7966	200 4491	204 1016	207 7541
80	175 0277	178 6802	182 3327	185 9852	189 6377	193 2902	196 9427	200 5952	204 2477	207 9002
84	175 1738	178 8263	182 4788	186 1313	189 7838	193 4363	197 0888	200 7413	204 3938	208 0463
88	175 3199	178 9724	182 6249	186 2774	189 9299	193 5824	197 2349	200 8874	204 5399	208 1924
92	175 4660	179 1185	182 7710	186 4235	190 0760	193 7285	197 3810	201 0335	204 6860	208 3385
96	175 6121	179 2646	182 9171	186 5696	190 2221	193 8746	197 5271	201 1796	204 8321	208 4846

To obtain the Julian Day Number for any date in the Julian Calendar before the beginning of the Christian Era, express the date astronomically, add the smallest multiple (*n*) of 1000 years that will convert the date into a date A. D., take out from Table IX the Julian Day Number for the date A. D. thus obtained, and subtract the same multiple (*n*) of 365250. The remainder is the Julian Day Number desired.

Example.—What is the Julian Day Number of March 12, 3284 B. C.?

March 12, 3284 B. C.=−3283, March 12

4×1000= 4000

Sum= 717, March 12

Julian Day Number, January 0, A. D. 716 1982576

Days from January 0, A. D. 716, to March 12, A. D. 717 +437

Julian Day Number, March 12, A. D. 717 1983013

4×365250 1461000

Julian Day Number, March 12, 3284 B. C. 522013

January 1, 4713 B. C., the first day of the Julian Era, has the Julian Day Number 0. The Julian Day Numbers are for the astronomical day, beginning at Greenwich Mean Noon.

JULIAN DAY NUMBER

DAYS ELAPSED AT GREENWICH MEAN NOON OF JANUARY 0

For A. D. 0 to A. D. 1580 inclusive, the Julian Day Numbers in this table are for January 0 of the Julian Calendar in each leap year.

For 1584 to 2096 inclusive, they are for January 0 of the Gregorian Calendar, except that in 1700, 1800, and 1900, which were not leap years, they are for January -1.

Table IXA is a more extended table for 1900 to 2019 inclusive.

A. D.	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900
0	208 6307	212 2832	215 9357	219 5882	223 2407	226 8932	230 5447	*234 1971	*237 8495	*241 5019
4	208 7768	212 4293	216 0818	219 7343	223 3868	227 0393	230 6908	234 3432	237 9956	241 6480
8	208 9229	212 5754	216 2279	219 8804	223 5329	227 1854	230 8369	234 4893	238 1417	241 7941
12	209 0690	212 7215	216 3740	220 0265	223 6790	227 3315	230 9830	234 6354	238 2878	241 9402
16	209 2151	212 8676	216 5201	220 1726	223 8251	227 4776	231 1291	234 7815	238 4339	242 0863
20	209 3612	213 0137	216 6662	220 3187	223 9712	227 6237	231 2752	234 9276	238 5800	242 2324
24	209 5073	213 1598	216 8123	220 4648	224 1173	227 7698	231 4213	235 0737	238 7261	242 3785
28	209 6534	213 3059	216 9584	220 6109	224 2634	227 9159	231 5674	235 2198	238 8722	242 5246
32	209 7995	213 4520	217 1045	220 7570	224 4095	228 0620	231 7135	235 3659	239 0183	242 6707
36	209 9456	213 5981	217 2506	220 9031	224 5556	228 2081	231 8596	235 5120	239 1644	242 8168
40	210 0917	213 7442	217 3967	221 0492	224 7017	228 3542	232 0057	235 6581	239 3105	242 9629
44	210 2378	213 8903	217 5428	221 1953	224 8478	228 5003	232 1518	235 8042	239 4566	243 1090
48	210 3839	214 0364	217 6889	221 3414	224 9939	228 6464	232 2979	235 9503	239 6027	243 2551
52	210 5300	214 1825	217 8350	221 4875	225 1400	228 7925	232 4440	236 0964	239 7488	243 4012
56	210 6761	214 3286	217 9811	221 6336	225 2861	228 9386	232 5901	236 2425	239 8949	243 5473
60	210 8222	214 4747	218 1272	221 7797	225 4322	229 0847	232 7362	236 3886	240 0410	243 6934
64	210 9683	214 6208	218 2733	221 9258	225 5783	229 2308	232 8823	236 5347	240 1871	243 8395
68	211 1144	214 7669	218 4194	222 0719	225 7244	229 3769	233 0284	236 6808	240 3332	243 9856
72	211 2605	214 9130	218 5655	222 2180	225 8705	229 5230	233 1745	236 8269	240 4793	244 1317
76	211 4066	215 0591	218 7116	222 3641	226 0166	229 6691	233 3206	236 9730	240 6254	244 2778
80	211 5527	215 2052	218 8577	222 5102	226 1627	229 8152	233 4667	237 1191	240 7715	244 4239
84	211 6988	215 3513	219 0038	222 6563	226 3088	229 9603	233 6128	237 2652	240 9176	244 5700
88	211 8449	215 4974	219 1499	222 8024	226 4549	230 1064	233 7589	237 4113	241 0637	244 7161
92	211 9910	215 6435	219 2960	222 9485	226 6010	230 2525	233 9050	237 5574	241 2098	244 8622
96	212 1371	215 7896	219 4421	223 0946	226 7471	230 3986	234 0511	237 7035	241 3559	245 0083

*For January -1.

†Julian Calendar.

‡Gregorian Calendar.

2000	245 1544	2020	245 8849	2040	246 6154	2060	247 3459	2080	248 0764
2004	245 3005	2024	246 0310	2044	246 7615	2064	247 4920	2084	248 2225
2008	245 4466	2028	246 1771	2048	246 9076	2068	247 6381	2088	248 3686
2012	245 5927	2032	246 3232	2052	247 0537	2072	247 7842	2092	248 5147
2016	245 7388	2036	246 4693	2056	247 1998	2076	247 9303	2096	248 6608

DAYS TO BE ADDED TO REDUCE TO THE BEGINNING OF EACH MONTH

For dates from 1582 October 15 to 1583 December 31, inclusive, Gregorian Calendar, *diminish all numbers in the following table by 10.*

In 1700, 1800, and 1900, Gregorian Calendar, *for January 0 use the number 1 instead of the tabular value 0, and for February 0 use 32 instead of 31.*

Year	Jan. 0	Feb. 0	Mar. 0	Apr. 0	May 0	June 0	July 0	Aug. 0	Sept. 0	Oct. 0	Nov. 0	Dec. 0
0	0	31	60	91	121	152	182	213	244	274	305	335
1	366	397	425	456	486	517	547	578	609	639	670	700
2	731	762	790	821	851	882	912	943	974	1004	1035	1065
3	1096	1127	1155	1186	1216	1247	1277	1308	1339	1369	1400	1430

TABLE IXA
JULIAN DAY NUMBER, 1900-2019
DAYS ELAPSED AT GREENWICH MEAN NOON

Year	Jan. 0	Feb. 0	Mar. 0	Apr. 0	May 0	June 0	July 0	Aug. 0	Sept. 0	Oct. 0	Nov. 0	Dec. 0
1900	241 5020	5051	5079	5110	5140	5171	5201	5232	5263	5293	5324	5354
1901	5385	5416	5444	5475	5505	5536	5566	5597	5628	5658	5689	5719
1902	5750	5781	5809	5840	5870	5901	5931	5962	5993	6023	6054	6084
1903	6115	6146	6174	6205	6235	6266	6296	6327	6358	6388	6419	6449
1904	6480	6511	6540	6571	6601	6632	6662	6693	6724	6754	6785	6815
1905	241 6846	6877	6905	6936	6966	6997	7027	7058	7089	7119	7150	7180
1906	7211	7242	7270	7301	7331	7362	7392	7423	7454	7484	7515	7545
1907	7576	7607	7635	7666	7696	7727	7757	7788	7819	7849	7880	7910
1908	7941	7972	8001	8032	8062	8093	8123	8154	8185	8215	8246	8276
1909	8307	8338	8366	8397	8427	8458	8488	8519	8550	8580	8611	8641
1910	241 8672	8703	8731	8762	8792	8823	8853	8884	8915	8945	8976	9006
1911	9037	9068	9096	9127	9157	9188	9218	9249	9280	9310	9341	9371
1912	9402	9433	9462	9493	9523	9554	9584	9615	9646	9676	9707	9737
1913	9768	9799	9827	9858	9888	9919	9949	9980	*0011	0041	0072	0102
1914	242 0133	0164	0192	0223	0253	0284	0314	0345	0376	0406	0437	0467
1915	242 0498	0529	0557	0588	0618	0649	0679	0710	0741	0771	0802	0832
1916	0863	0894	0923	0954	0984	1015	1045	1076	1107	1137	1168	1198
1917	1229	1260	1288	1319	1349	1380	1410	1441	1472	1502	1533	1563
1918	1594	1625	1653	1684	1714	1745	1775	1806	1837	1867	1898	1928
1919	1959	1990	2018	2049	2079	2110	2140	2171	2202	2232	2263	2293
1920	242 2324	2355	2384	2415	2445	2476	2506	2537	2568	2598	2629	2659
1921	2690	2721	2749	2780	2810	2841	2871	2902	2933	2963	2994	3024
1922	3055	3086	3114	3145	3175	3206	3236	3267	3298	3328	3359	3389
1923	3420	3451	3479	3510	3540	3571	3601	3632	3663	3693	3724	3754
1924	3785	3816	3845	3876	3906	3937	3967	3998	4029	4059	4090	4120
1925	242 4151	4182	4210	4241	4271	4302	4332	4363	4394	4424	4455	4485
1926	4516	4547	4575	4606	4636	4667	4697	4728	4759	4789	4820	4850
1927	4881	4912	4940	4971	5001	5032	5062	5093	5124	5154	5185	5215
1928	5246	5277	5306	5337	5367	5398	5428	5459	5490	5520	5551	5581
1929	5612	5643	5671	5702	5732	5763	5793	5824	5855	5885	5916	5946
1930	242 5977	6008	6036	6067	6097	6128	6158	6189	6220	6250	6281	6311
1931	6342	6373	6401	6432	6462	6493	6523	6554	6585	6615	6646	6676
1932	6707	6738	6767	6798	6828	6859	6889	6920	6951	6981	7012	7042
1933	7073	7104	7132	7163	7193	7224	7254	7285	7316	7346	7377	7407
1934	7438	7469	7497	7528	7558	7589	7619	7650	7681	7711	7742	7772
1935	242 7803	7834	7862	7893	7923	7954	7984	8015	8046	8076	8107	8137
1936	8168	8199	8228	8259	8289	8320	8350	8381	8412	8442	8473	8503
1937	8534	8565	8593	8624	8654	8685	8715	8746	8777	8807	8838	8868
1938	8899	8930	8958	8989	9019	9050	9080	9111	9142	9172	9203	9233
1939	9264	9295	9323	9354	9384	9415	9445	9476	9507	9537	9568	9598
1940	242 9629	9660	9689	9720	9750	9781	9811	9842	9873	9903	9934	9964
1941	9995	*0026	0054	0085	0115	0146	0176	0207	0238	0268	0299	0329
1942	243 0360	0391	0419	0450	0480	0511	0541	0572	0603	0633	0664	0694
1943	0725	0756	0784	0815	0845	0876	0906	0937	0968	0998	1029	1059
1944	1090	1121	1150	1181	1211	1242	1272	1303	1334	1364	1395	1425
1945	243 1456	1487	1515	1546	1576	1607	1637	1668	1699	1729	1760	1790
1946	1821	1852	1880	1911	1941	1972	2002	2033	2064	2094	2125	2155
1947	2186	2217	2245	2276	2306	2337	2367	2398	2429	2459	2490	2520
1948	2551	2582	2611	2642	2672	2703	2733	2764	2795	2825	2856	2886
1949	2917	2948	2976	3007	3037	3068	3098	3129	3160	3190	3221	3251
1950	243 3282	3313	3341	3372	3402	3433	3463	3494	3525	3555	3586	3616
1951	3647	3678	3706	3737	3767	3798	3828	3859	3890	3920	3951	3981
1952	4012	4043	4072	4103	4133	4164	4194	4225	4256	4286	4317	4347
1953	4378	4409	4437	4468	4498	4529	4559	4590	4621	4651	4682	4712
1954	4743	4774	4802	4833	4863	4894	4924	4955	4986	5016	5047	5077
1955	243 5108	5139	5167	5198	5228	5259	5289	5320	5351	5381	5412	5442
1956	5473	5504	5533	5564	5594	5625	5655	5686	5717	5747	5778	5808
1957	5839	5870	5898	5929	5959	5990	6020	6051	6082	6112	6143	6173
1958	6204	6235	6263	6294	6324	6355	6385	6416	6447	6477	6508	6538
1959	6569	6600	6628	6659	6689	6720	6750	6781	6812	6842	6873	6903

JULIAN DAY NUMBER, 1900-2019

DAYS ELAPSED AT GREENWICH MEAN NOON

Year	Jan. 0	Feb. 0	Mar. 0	Apr. 0	May 0	June 0	July 0	Aug. 0	Sept. 0	Oct. 0	Nov. 0	Dec. 0
1960	243 6934	6965	6994	7025	7055	7086	7116	7147	7178	7208	7239	7269
1961	7300	7331	7359	7390	7420	7451	7481	7512	7543	7573	7604	7634
1962	7665	7696	7724	7755	7785	7816	7846	7877	7908	7938	7969	7999
1963	8030	8061	8089	8120	8150	8181	8211	8242	8273	8303	8334	8364
1964	8395	8426	8455	8486	8516	8547	8577	8608	8639	8669	8700	8730
1965	243 8761	8792	8820	8851	8881	8912	8942	8973	9004	9034	9065	9095
1966	9126	9157	9185	9216	9246	9277	9307	9338	9369	9399	9430	9460
1967	9491	9522	9550	9581	9611	9642	9672	9703	9734	9764	9795	9825
1968	9856	9887	9916	9947	9977	*0008	0038	0069	0100	0130	0161	0191
1969	244 0222	0253	0281	0312	0342	0373	0403	0434	0465	0495	0526	0556
1970	244 0587	0618	0646	0677	0707	0738	0768	0799	0830	0860	0891	0921
1971	0952	0983	1011	1042	1072	1103	1133	1164	1195	1225	1256	1286
1972	1317	1348	1377	1408	1438	1469	1499	1530	1561	1591	1622	1652
1973	1683	1714	1742	1773	1803	1834	1864	1895	1926	1956	1987	2017
1974	2048	2079	2107	2138	2168	2199	2229	2260	2291	2321	2352	2382
1975	244 2413	2444	2472	2503	2533	2564	2594	2625	2656	2686	2717	2747
1976	2778	2809	2838	2869	2899	2930	2960	2991	3022	3052	3083	3113
1977	3144	3175	3203	3234	3264	3295	3325	3356	3387	3417	3448	3478
1978	3509	3540	3568	3599	3629	3660	3690	3721	3752	3782	3813	3843
1979	3874	3905	3933	3964	3994	4025	4055	4086	4117	4147	4178	4208
1980	244 4239	4270	4299	4330	4360	4391	4421	4452	4483	4513	4544	4574
1981	4605	4636	4664	4695	4725	4756	4786	4817	4848	4878	4909	4939
1982	4970	5001	5029	5060	5090	5121	5151	5182	5213	5243	5274	5304
1983	5335	5366	5394	5425	5455	5486	5516	5547	5578	5608	5639	5669
1984	5700	5731	5760	5791	5821	5852	5882	5913	5944	5974	6005	6035
1985	244 6066	6097	6125	6156	6186	6217	6247	6278	6309	6339	6370	6400
1986	6431	6462	6490	6521	6551	6582	6612	6643	6674	6704	6735	6765
1987	6796	6827	6855	6886	6916	6947	6977	7008	7039	7069	7100	7130
1988	7161	7192	7221	7252	7282	7313	7343	7374	7405	7435	7466	7496
1989	7527	7558	7586	7617	7647	7678	7708	7739	7770	7800	7831	7861
1990	244 7892	7923	7951	7982	8012	8043	8073	8104	8135	8165	8196	8226
1991	8257	8288	8316	8347	8377	8408	8438	8469	8500	8530	8561	8591
1992	8622	8653	8682	8713	8743	8774	8804	8835	8866	8896	8927	8957
1993	8988	9019	9047	9078	9108	9139	9169	9200	9231	9261	9292	9322
1994	9353	9384	9412	9443	9473	9504	9534	9565	9596	9626	9657	9687
1995	244 9718	9749	9777	9808	9838	9869	9899	9930	9961	9991	*0022	0052
1996	245 0083	0114	0143	0174	0204	0235	0265	0296	0327	0357	0388	0418
1997	0449	0480	0508	0539	0569	0600	0630	0661	0692	0722	0753	0783
1998	0814	0845	0873	0904	0934	0965	0995	1026	1057	1087	1118	1148
1999	1179	1210	1238	1269	1299	1330	1360	1391	1422	1452	1483	1513
2000	245 1544	1575	1604	1635	1665	1696	1726	1757	1788	1818	1849	1879
2001	1910	1941	1969	2000	2030	2061	2091	2122	2153	2183	2214	2244
2002	2275	2306	2334	2365	2395	2426	2456	2487	2518	2548	2579	2609
2003	2640	2671	2699	2730	2760	2791	2821	2852	2883	2913	2944	2974
2004	3005	3036	3065	3096	3126	3157	3187	3218	3249	3279	3310	3340
2005	245 3371	3402	3430	3461	3491	3522	3552	3583	3614	3644	3675	3705
2006	3736	3767	3795	3826	3856	3887	3917	3948	3979	4009	4040	4070
2007	4101	4132	4160	4191	4221	4252	4282	4313	4344	4374	4405	4435
2008	4466	4497	4526	4557	4587	4618	4648	4679	4710	4740	4771	4801
2009	4832	4863	4891	4922	4952	4983	5013	5044	5075	5105	5136	5166
2010	245 5197	5228	5256	5287	5317	5348	5378	5409	5440	5470	5501	5531
2011	5562	5593	5621	5652	5682	5713	5743	5774	5805	5835	5866	5896
2012	5927	5958	5987	6018	6048	6079	6109	6140	6171	6201	6232	6262
2013	6293	6324	6352	6383	6413	6444	6474	6505	6536	6566	6597	6627
2014	6658	6689	6717	6748	6778	6809	6839	6870	6901	6931	6962	6992
2015	245 7023	7054	7082	7113	7143	7174	7204	7235	7266	7296	7327	7357
2016	7388	7419	7448	7479	7509	7540	7570	7601	7632	7662	7693	7723
2017	7754	7785	7813	7844	7874	7905	7935	7966	7997	8027	8058	8088
2018	8119	8150	8178	8209	8239	8270	8300	8331	8362	8392	8423	8453
2019	8484	8515	8543	8574	8604	8635	8665	8696	8727	8757	8788	8818

TABLE X
CONVERSION OF ARC TO TIME

DEGREES						MINUTES			SECONDS					
°	h	m	°	h	m	°	h	m	"	s	"	s	"	s
0	0	00	60	4	00	120	8	00	0	0.000	0.00	0.000	0.50	0.033
1	0	04	61	4	04	121	8	04	1	0.067	.01	.001	.51	.034
2	0	08	62	4	08	122	8	08	2	0.133	.02	.001	.52	.035
3	0	12	63	4	12	123	8	12	3	0.200	.03	.002	.53	.035
4	0	16	64	4	16	124	8	16	4	0.267	.04	.003	.54	.036
5	0	20	65	4	20	125	8	20	5	0.333	0.05	0.003	0.55	0.037
6	0	24	66	4	24	126	8	24	6	0.400	.06	.004	.56	.037
7	0	28	67	4	28	127	8	28	7	0.467	.07	.005	.57	.038
8	0	32	68	4	32	128	8	32	8	0.533	.08	.005	.58	.039
9	0	36	69	4	36	129	8	36	9	0.600	.09	.006	.59	.039
10	0	40	70	4	40	130	8	40	10	0.667	0.10	0.007	0.60	0.040
11	0	44	71	4	44	131	8	44	11	0.733	.11	.007	.61	.041
12	0	48	72	4	48	132	8	48	12	0.800	.12	.008	.62	.041
13	0	52	73	4	52	133	8	52	13	0.867	.13	.009	.63	.042
14	0	56	74	4	56	134	8	56	14	0.933	.14	.009	.64	.043
15	1	00	75	5	00	135	9	00	15	1.000	0.15	0.010	0.65	0.043
16	1	04	76	5	04	136	9	04	16	1.067	.16	.011	.66	.044
17	1	08	77	5	08	137	9	08	17	1.133	.17	.011	.67	.045
18	1	12	78	5	12	138	9	12	18	1.200	.18	.012	.68	.045
19	1	16	79	5	16	139	9	16	19	1.267	.19	.013	.69	.046
20	1	20	80	5	20	140	9	20	20	1.333	0.20	0.013	0.70	0.047
21	1	24	81	5	24	141	9	24	21	1.400	.21	.014	.71	.047
22	1	28	82	5	28	142	9	28	22	1.467	.22	.015	.72	.048
23	1	32	83	5	32	143	9	32	23	1.533	.23	.015	.73	.049
24	1	36	84	5	36	144	9	36	24	1.600	.24	.016	.74	.049
25	1	40	85	5	40	145	9	40	25	1.667	0.25	0.017	0.75	0.050
26	1	44	86	5	44	146	9	44	26	1.733	.26	.017	.76	.051
27	1	48	87	5	48	147	9	48	27	1.800	.27	.018	.77	.051
28	1	52	88	5	52	148	9	52	28	1.867	.28	.019	.78	.052
29	1	56	89	5	56	149	9	56	29	1.933	.29	.019	.79	.053
30	2	00	90	6	00	150	10	00	30	2.000	0.30	0.020	0.80	0.053
31	2	04	91	6	04	151	10	04	31	2.067	.31	.021	.81	.054
32	2	08	92	6	08	152	10	08	32	2.133	.32	.021	.82	.055
33	2	12	93	6	12	153	10	12	33	2.200	.33	.022	.83	.055
34	2	16	94	6	16	154	10	16	34	2.267	.34	.023	.84	.056
35	2	20	95	6	20	155	10	20	35	2.333	0.35	0.023	0.85	0.057
36	2	24	96	6	24	156	10	24	36	2.400	.36	.024	.86	.057
37	2	28	97	6	28	157	10	28	37	2.467	.37	.025	.87	.058
38	2	32	98	6	32	158	10	32	38	2.533	.38	.025	.88	.059
39	2	36	99	6	36	159	10	36	39	2.600	.39	.026	.89	.059
40	2	40	100	6	40	160	10	40	40	2.667	0.40	0.027	0.90	0.060
41	2	44	101	6	44	161	10	44	41	2.733	.41	.027	.91	.061
42	2	48	102	6	48	162	10	48	42	2.800	.42	.028	.92	.061
43	2	52	103	6	52	163	10	52	43	2.867	.43	.029	.93	.062
44	2	56	104	6	56	164	10	56	44	2.933	.44	.029	.94	.063
45	3	00	105	7	00	165	11	00	45	3.000	0.45	0.030	0.95	0.063
46	3	04	106	7	04	166	11	04	46	3.067	.46	.031	.96	.064
47	3	08	107	7	08	167	11	08	47	3.133	.47	.031	.97	.065
48	3	12	108	7	12	168	11	12	48	3.200	.48	.032	.98	.065
49	3	16	109	7	16	169	11	16	49	3.267	.49	.033	0.99	.066
50	3	20	110	7	20	170	11	20	50	3.333	0.50	0.033	1.00	0.067
51	3	24	111	7	24	171	11	24	51	3.400				
52	3	28	112	7	28	172	11	28	52	3.467				
53	3	32	113	7	32	173	11	32	53	3.533				
54	3	36	114	7	36	174	11	36	54	3.600				
55	3	40	115	7	40	175	11	40	55	3.667				
56	3	44	116	7	44	176	11	44	56	3.733				
57	3	48	117	7	48	177	11	48	57	3.800				
58	3	52	118	7	52	178	11	52	58	3.867				
59	3	56	119	7	56	179	11	56	59	3.933				

CONVERSION OF TIME TO ARC

	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	SECONDS					
m	°	'	°	'	°	'	°	'	°	'	°	'
0	0 00	15 00	30 00	45 00	60 00	75 00	0	0 00	0.00	0.00	0.50	7.50
1	0 15	15 15	30 15	45 15	60 15	75 15	1	0 15	.01	0.15	.51	7.65
2	0 30	15 30	30 30	45 30	60 30	75 30	2	0 30	.02	0.30	.52	7.80
3	0 45	15 45	30 45	45 45	60 45	75 45	3	0 45	.03	0.45	.53	7.95
4	1 00	16 00	31 00	46 00	61 00	76 00	4	1 00	.04	0.60	.54	8.10
5	1 15	16 15	31 15	46 15	61 15	76 15	5	1 15	0.05	0.75	0.55	8.25
6	1 30	16 30	31 30	46 30	61 30	76 30	6	1 30	.06	0.90	.56	8.40
7	1 45	16 45	31 45	46 45	61 45	76 45	7	1 45	.07	1.05	.57	8.55
8	2 00	17 00	32 00	47 00	62 00	77 00	8	2 00	.08	1.20	.58	8.70
9	2 15	17 15	32 15	47 15	62 15	77 15	9	2 15	.09	1.35	.59	8.85
10	2 30	17 30	32 30	47 30	62 30	77 30	10	2 30	0.10	1.50	0.60	9.00
11	2 45	17 45	32 45	47 45	62 45	77 45	11	2 45	.11	1.65	.61	9.15
12	3 00	18 00	33 00	48 00	63 00	78 00	12	3 00	.12	1.80	.62	9.30
13	3 15	18 15	33 15	48 15	63 15	78 15	13	3 15	.13	1.95	.63	9.45
14	3 30	18 30	33 30	48 30	63 30	78 30	14	3 30	.14	2.10	.64	9.60
15	3 45	18 45	33 45	48 45	63 45	78 45	15	3 45	0.15	2.25	0.65	9.75
16	4 00	19 00	34 00	49 00	64 00	79 00	16	4 00	.16	2.40	.66	9.90
17	4 15	19 15	34 15	49 15	64 15	79 15	17	4 15	.17	2.55	.67	10.05
18	4 30	19 30	34 30	49 30	64 30	79 30	18	4 30	.18	2.70	.68	10.20
19	4 45	19 45	34 45	49 45	64 45	79 45	19	4 45	.19	2.85	.69	10.35
20	5 00	20 00	35 00	50 00	65 00	80 00	20	5 00	0.20	3.00	0.70	10.50
21	5 15	20 15	35 15	50 15	65 15	80 15	21	5 15	.21	3.15	.71	10.65
22	5 30	20 30	35 30	50 30	65 30	80 30	22	5 30	.22	3.30	.72	10.80
23	5 45	20 45	35 45	50 45	65 45	80 45	23	5 45	.23	3.45	.73	10.95
24	6 00	21 00	36 00	51 00	66 00	81 00	24	6 00	.24	3.60	.74	11.10
25	6 15	21 15	36 15	51 15	66 15	81 15	25	6 15	0.25	3.75	0.75	11.25
26	6 30	21 30	36 30	51 30	66 30	81 30	26	6 30	.26	3.90	.76	11.40
27	6 45	21 45	36 45	51 45	66 45	81 45	27	6 45	.27	4.05	.77	11.55
28	7 00	22 00	37 00	52 00	67 00	82 00	28	7 00	.28	4.20	.78	11.70
29	7 15	22 15	37 15	52 15	67 15	82 15	29	7 15	.29	4.35	.79	11.85
30	7 30	22 30	37 30	52 30	67 30	82 30	30	7 30	0.30	4.50	0.80	12.00
31	7 45	22 45	37 45	52 45	67 45	82 45	31	7 45	.31	4.65	.81	12.15
32	8 00	23 00	38 00	53 00	68 00	83 00	32	8 00	.32	4.80	.82	12.30
33	8 15	23 15	38 15	53 15	68 15	83 15	33	8 15	.33	4.95	.83	12.45
34	8 30	23 30	38 30	53 30	68 30	83 30	34	8 30	.34	5.10	.84	12.60
35	8 45	23 45	38 45	53 45	68 45	83 45	35	8 45	0.35	5.25	0.85	12.75
36	9 00	24 00	39 00	54 00	69 00	84 00	36	9 00	.36	5.40	.86	12.90
37	9 15	24 15	39 15	54 15	69 15	84 15	37	9 15	.37	5.55	.87	13.05
38	9 30	24 30	39 30	54 30	69 30	84 30	38	9 30	.38	5.70	.88	13.20
39	9 45	24 45	39 45	54 45	69 45	84 45	39	9 45	.39	5.85	.89	13.35
40	10 00	25 00	40 00	55 00	70 00	85 00	40	10 00	0.40	6.00	0.90	13.50
41	10 15	25 15	40 15	55 15	70 15	85 15	41	10 15	.41	6.15	.91	13.65
42	10 30	25 30	40 30	55 30	70 30	85 30	42	10 30	.42	6.30	.92	13.80
43	10 45	25 45	40 45	55 45	70 45	85 45	43	10 45	.43	6.45	.93	13.95
44	11 00	26 00	41 00	56 00	71 00	86 00	44	11 00	.44	6.60	.94	14.10
45	11 15	26 15	41 15	56 15	71 15	86 15	45	11 15	0.45	6.75	0.95	14.25
46	11 30	26 30	41 30	56 30	71 30	86 30	46	11 30	.46	6.90	.96	14.40
47	11 45	26 45	41 45	56 45	71 45	86 45	47	11 45	.47	7.05	.97	14.55
48	12 00	27 00	42 00	57 00	72 00	87 00	48	12 00	.48	7.20	.98	14.70
49	12 15	27 15	42 15	57 15	72 15	87 15	49	12 15	.49	7.35	0.99	14.85
50	12 30	27 30	42 30	57 30	72 30	87 30	50	12 30	0.50	7.50	1.00	15.00
51	12 45	27 45	42 45	57 45	72 45	87 45	51	12 45				
52	13 00	28 00	43 00	58 00	73 00	88 00	52	13 00				
53	13 15	28 15	43 15	58 15	73 15	88 15	53	13 15				
54	13 30	28 30	43 30	58 30	73 30	88 30	54	13 30				
55	13 45	28 45	43 45	58 45	73 45	88 45	55	13 45				
56	14 00	29 00	44 00	59 00	74 00	89 00	56	14 00				
57	14 15	29 15	44 15	59 15	74 15	89 15	57	14 15				
58	14 30	29 30	44 30	59 30	74 30	89 30	58	14 30				
59	14 45	29 45	44 45	59 45	74 45	89 45	59	14 45				

$$\begin{matrix} h & ^\circ \\ 6 = & 90 \end{matrix}$$

12=180

18=270

CONVERSION OF HOURS, MINUTES, AND SECONDS TO DECIMALS OF A DAY

	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	SECONDS	
m	d	d	d	d	d	d	s	d
0	0.000 000	0.041 667	0.083 333	0.125 000	0.166 667	0.208 333	0	0.000 000
1	.000 694	.042 361	.084 028	.125 694	.167 361	.209 028	1	.000 012
2	.001 389	.043 056	.084 722	.126 389	.168 056	.209 722	2	.000 023
3	.002 083	.043 750	.085 417	.127 083	.168 750	.210 417	3	.000 035
4	.002 778	.044 444	.086 111	.127 778	.169 444	.211 111	4	.000 046
5	0.003 472	0.045 139	0.086 806	0.128 472	0.170 139	0.211 806	5	0.000 058
6	.004 167	.045 833	.087 500	.129 167	.170 833	.212 500	6	.000 069
7	.004 861	.046 528	.088 194	.129 861	.171 528	.213 194	7	.000 081
8	.005 556	.047 222	.088 889	.130 556	.172 222	.213 889	8	.000 093
9	.006 250	.047 917	.089 583	.131 250	.172 917	.214 583	9	.000 104
10	0.006 944	0.048 611	0.090 278	0.131 944	0.173 611	0.215 278	10	0.000 116
11	.007 639	.049 306	.090 972	.132 639	.174 306	.215 972	11	.000 127
12	.008 333	.050 000	.091 667	.133 333	.175 000	.216 667	12	.000 139
13	.009 028	.050 694	.092 361	.134 028	.175 694	.217 361	13	.000 150
14	.009 722	.051 389	.093 056	.134 722	.176 389	.218 056	14	.000 162
15	0.010 417	0.052 083	0.093 750	0.135 417	0.177 083	0.218 750	15	0.000 174
16	.011 111	.052 778	.094 444	.136 111	.177 778	.219 444	16	.000 185
17	.011 806	.053 472	.095 139	.136 806	.178 472	.220 139	17	.000 197
18	.012 500	.054 167	.095 833	.137 500	.179 167	.220 833	18	.000 208
19	.013 194	.054 861	.096 528	.138 194	.179 861	.221 528	19	.000 220
20	0.013 889	0.055 556	0.097 222	0.138 889	0.180 556	0.222 222	20	0.000 231
21	.014 583	.056 250	.097 917	.139 583	.181 250	.222 917	21	.000 243
22	.015 278	.056 944	.098 611	.140 278	.181 944	.223 611	22	.000 255
23	.015 972	.057 639	.099 306	.140 972	.182 639	.224 306	23	.000 266
24	.016 667	.058 333	.100 000	.141 667	.183 333	.225 000	24	.000 278
25	0.017 361	0.059 028	0.100 694	0.142 361	0.184 028	0.225 694	25	0.000 289
26	.018 056	.059 722	.101 389	.143 056	.184 722	.226 389	26	.000 301
27	.018 750	.060 417	.102 083	.143 750	.185 417	.227 083	27	.000 312
28	.019 444	.061 111	.102 778	.144 444	.186 111	.227 778	28	.000 324
29	.020 139	.061 806	.103 472	.145 139	.186 806	.228 472	29	.000 336
30	0.020 833	0.062 500	0.104 167	0.145 833	0.187 500	0.229 167	30	0.000 347
31	.021 528	.063 194	.104 861	.146 528	.188 194	.229 861	31	.000 359
32	.022 222	.063 889	.105 556	.147 222	.188 889	.230 556	32	.000 370
33	.022 917	.064 583	.106 250	.147 917	.189 583	.231 250	33	.000 382
34	.023 611	.065 278	.106 944	.148 611	.190 278	.231 944	34	.000 394
35	0.024 306	0.065 972	0.107 639	0.149 306	0.190 972	0.232 639	35	0.000 405
36	.025 000	.066 667	.108 333	.150 000	.191 667	.233 333	36	.000 417
37	.025 694	.067 361	.109 028	.150 694	.192 361	.234 028	37	.000 428
38	.026 389	.068 056	.109 722	.151 389	.193 056	.234 722	38	.000 440
39	.027 083	.068 750	.110 417	.152 083	.193 750	.235 417	39	.000 451
40	0.027 778	0.069 444	0.111 111	0.152 778	0.194 444	0.236 111	40	0.000 463
41	.028 472	.070 139	.111 806	.153 472	.195 139	.236 806	41	.000 475
42	.029 167	.070 833	.112 500	.154 167	.195 833	.237 500	42	.000 486
43	.029 861	.071 528	.113 194	.154 861	.196 528	.238 194	43	.000 498
44	.030 556	.072 222	.113 889	.155 556	.197 222	.238 889	44	.000 509
45	0.031 250	0.072 917	0.114 583	0.156 250	0.197 917	0.239 583	45	0.000 521
46	.031 944	.073 611	.115 278	.156 944	.198 611	.240 278	46	.000 532
47	.032 639	.074 306	.115 972	.157 639	.199 306	.240 972	47	.000 544
48	.033 333	.075 000	.116 667	.158 333	.200 000	.241 667	48	.000 556
49	.034 028	.075 694	.117 361	.159 028	.200 694	.242 361	49	.000 567
50	0.034 722	0.076 389	0.118 056	0.159 722	0.201 389	0.243 056	50	0.000 579
51	.035 417	.077 083	.118 750	.160 417	.202 083	.243 750	51	.000 590
52	.036 111	.077 778	.119 444	.161 111	.202 778	.244 444	52	.000 602
53	.036 806	.078 472	.120 139	.161 806	.203 472	.245 139	53	.000 613
54	.037 500	.079 167	.120 833	.162 500	.204 167	.245 833	54	.000 625
55	0.038 194	0.079 861	0.121 528	0.163 194	0.204 861	0.246 528	55	0.000 637
56	.038 889	.080 556	.122 222	.163 889	.205 556	.247 222	56	.000 648
57	.039 583	.081 250	.122 917	.164 583	.206 250	.247 917	57	.000 660
58	.040 278	.081 944	.123 611	.165 278	.206 944	.248 611	58	.000 671
59	0.040 972	0.082 639	0.124 306	0.165 972	0.207 639	0.249 306	59	0.000 683

CONVERSION OF HOURS, MINUTES, AND SECONDS TO DECIMALS OF A DAY

	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h	SECONDS	
m	d	d	d	d	d	d	s	d
0	0.250 000	0.291 667	0.333 333	0.375 000	0.416 667	0.458 333	0	0.000 000
1	.250 694	.292 361	.334 028	.375 694	.417 361	.459 028	1	.000 012
2	.251 389	.293 056	.334 722	.376 389	.418 056	.459 722	2	.000 023
3	.252 083	.293 750	.335 417	.377 083	.418 750	.460 417	3	.000 035
4	.252 778	.294 444	.336 111	.377 778	.419 444	.461 111	4	.000 046
5	0.253 472	0.295 139	0.336 806	0.378 472	0.420 139	0.461 806	5	0.000 058
6	.254 167	.295 833	.337 500	.379 167	.420 833	.462 500	6	.000 069
7	.254 861	.296 528	.338 194	.379 861	.421 528	.463 194	7	.000 081
8	.255 556	.297 222	.338 889	.380 556	.422 222	.463 889	8	.000 093
9	.256 250	.297 917	.339 583	.381 250	.422 917	.464 583	9	.000 104
10	0.256 944	0.298 611	0.340 278	0.381 944	0.423 611	0.465 278	10	0.000 116
11	.257 639	.299 306	.340 972	.382 639	.424 306	.465 972	11	.000 127
12	.258 333	.300 000	.341 667	.383 333	.425 000	.466 667	12	.000 139
13	.259 028	.300 694	.342 361	.384 028	.425 694	.467 361	13	.000 150
14	.259 722	.301 389	.343 056	.384 722	.426 389	.468 056	14	.000 162
15	0.260 417	0.302 083	0.343 750	0.385 417	0.427 083	0.468 750	15	0.000 174
16	.261 111	.302 778	.344 444	.386 111	.427 778	.469 444	16	.000 185
17	.261 806	.303 472	.345 139	.386 806	.428 472	.470 139	17	.000 197
18	.262 500	.304 167	.345 833	.387 500	.429 167	.470 833	18	.000 208
19	.263 194	.304 861	.346 528	.388 194	.429 861	.471 528	19	.000 220
20	0.263 889	0.305 556	0.347 222	0.388 889	0.430 556	0.472 222	20	0.000 231
21	.264 583	.306 250	.347 917	.389 583	.431 250	.472 917	21	.000 243
22	.265 278	.306 944	.348 611	.390 278	.431 944	.473 611	22	.000 255
23	.265 972	.307 639	.349 306	.390 972	.432 639	.474 306	23	.000 266
24	.266 667	.308 333	.350 000	.391 667	.433 333	.475 000	24	.000 278
25	0.267 361	0.309 028	0.350 694	0.392 361	0.434 028	0.475 694	25	0.000 289
26	.268 056	.309 722	.351 389	.393 056	.434 722	.476 389	26	.000 301
27	.268 750	.310 417	.352 083	.393 750	.435 417	.477 083	27	.000 312
28	.269 444	.311 111	.352 778	.394 444	.436 111	.477 778	28	.000 324
29	.270 139	.311 806	.353 472	.395 139	.436 806	.478 472	29	.000 336
30	0.270 833	0.312 500	0.354 167	0.395 833	0.437 500	0.479 167	30	0.000 347
31	.271 528	.313 194	.354 861	.396 528	.438 194	.479 861	31	.000 359
32	.272 222	.313 889	.355 556	.397 222	.438 889	.480 556	32	.000 370
33	.272 917	.314 583	.356 250	.397 917	.439 583	.481 250	33	.000 382
34	.273 611	.315 278	.356 944	.398 611	.440 278	.481 944	34	.000 394
35	0.274 306	0.315 972	0.357 639	0.399 306	0.440 972	0.482 639	35	0.000 405
36	.275 000	.316 667	.358 333	.400 000	.441 667	.483 333	36	.000 417
37	.275 694	.317 361	.359 028	.400 694	.442 361	.484 028	37	.000 428
38	.276 389	.318 056	.359 722	.401 389	.443 056	.484 722	38	.000 440
39	.277 083	.318 750	.360 417	.402 083	.443 750	.485 417	39	.000 451
40	0.277 778	0.319 444	0.361 111	0.402 778	0.444 444	0.486 111	40	0.000 463
41	.278 472	.320 139	.361 806	.403 472	.445 139	.486 806	41	.000 475
42	.279 167	.320 833	.362 500	.404 167	.445 833	.487 500	42	.000 486
43	.279 861	.321 528	.363 194	.404 861	.446 528	.488 194	43	.000 498
44	.280 556	.322 222	.363 889	.405 556	.447 222	.488 889	44	.000 509
45	0.281 250	0.322 917	0.364 583	0.406 250	0.447 917	0.489 583	45	0.000 521
46	.281 944	.323 611	.365 278	.406 944	.448 611	.490 278	46	.000 532
47	.282 639	.324 306	.365 972	.407 639	.449 306	.490 972	47	.000 544
48	.283 333	.325 000	.366 667	.408 333	.450 000	.491 667	48	.000 556
49	.284 028	.325 694	.367 361	.409 028	.450 694	.492 361	49	.000 567
50	0.284 722	0.326 389	0.368 056	0.409 722	0.451 389	0.493 056	50	0.000 579
51	.285 417	.327 083	.368 750	.410 417	.452 083	.493 750	51	.000 590
52	.286 111	.327 778	.369 444	.411 111	.452 778	.494 444	52	.000 602
53	.286 806	.328 472	.370 139	.411 806	.453 472	.495 139	53	.000 613
54	.287 500	.329 167	.370 833	.412 500	.454 167	.495 833	54	.000 625
55	0.288 194	0.329 861	0.371 528	0.413 194	0.454 861	0.496 528	55	0.000 637
56	.288 889	.330 556	.372 222	.413 889	.455 556	.497 222	56	.000 648
57	.289 583	.331 250	.372 917	.414 583	.456 250	.497 917	57	.000 660
58	.290 278	.331 944	.373 611	.415 278	.456 944	.498 611	58	.000 671
59	0.290 972	0.332 639	0.374 306	0.415 972	0.457 639	0.499 306	59	0.000 683

EVERETT COEFFICIENTS OF THE SECOND DIFFERENCE

The coefficients are always negative

<i>n</i> <i>E</i> ₀ '' <i>E</i> ₁ ''				<i>n</i> <i>E</i> ₀ '' <i>E</i> ₁ ''				<i>n</i> <i>E</i> ₀ '' <i>E</i> ₁ ''			
0.000			1.000	0.050			0.950	0.100			0.900
.001	0.0002	0.0001	0.999	.051	0.0156	0.0084	.949	.101	0.0286	0.0166	.899
.002	.0005	.0002	.998	.052	.0159	.0086	.948	.102	.0289	.0167	.898
.003	.0008	.0004	.997	.053	.0161	.0087	.947	.103	.0291	.0169	.897
.004	.0012	.0006	.996	.054	.0164	.0089	.946	.104	.0293	.0171	.896
.005	.0015	.0007	.995	.055	.0167	.0091	.945	.105	.0296	.0172	.895
.006	.0018	.0009	.994	.056	.0170	.0092	.944	.106	.0298	.0174	.894
.007	.0021	.0011	.993	.057	.0173	.0094	.943	.107	.0300	.0175	.893
.008	.0025	.0012	.992	.058	.0175	.0096	.942	.108	.0303	.0177	.892
.009	.0028	.0014	.991	.059	.0178	.0097	.941	.109	.0305	.0179	.891
.010	.0031	.0016	.990	.060	.0181	.0099	.940	.110	.0307	.0180	.890
.011	.0034	.0017	.989	.061	.0184	.0100	.939	.111	.0310	.0182	.889
.012	.0038	.0019	.988	.062	.0186	.0102	.938	.112	.0312	.0184	.888
.013	.0041	.0021	.987	.063	.0189	.0104	.937	.113	.0314	.0185	.887
.014	.0044	.0022	.986	.064	.0192	.0105	.936	.114	.0316	.0187	.886
.015	.0047	.0024	.985	.065	.0195	.0107	.935	.115	.0319	.0188	.885
.016	.0050	.0026	.984	.066	.0197	.0109	.934	.116	.0321	.0190	.884
.017	.0054	.0027	.983	.067	.0200	.0110	.933	.117	.0323	.0192	.883
.018	.0057	.0029	.982	.068	.0203	.0112	.932	.118	.0325	.0193	.882
.019	.0060	.0031	.981	.069	.0205	.0114	.931	.119	.0328	.0195	.881
.020	.0063	.0032	.980	.070	.0208	.0115	.930	.120	.0330	.0196	.880
.021	.0066	.0034	.979	.071	.0211	.0117	.929	.121	.0332	.0198	.879
.022	.0069	.0036	.978	.072	.0213	.0119	.928	.122	.0334	.0200	.878
.023	.0072	.0037	.977	.073	.0216	.0120	.927	.123	.0336	.0201	.877
.024	.0076	.0039	.976	.074	.0219	.0122	.926	.124	.0339	.0203	.876
.025	.0079	.0041	.975	.075	.0221	.0123	.925	.125	.0341	.0204	.875
.026	.0082	.0042	.974	.076	.0224	.0125	.924	.126	.0343	.0206	.874
.027	.0085	.0044	.973	.077	.0226	.0127	.923	.127	.0345	.0207	.873
.028	.0088	.0046	.972	.078	.0229	.0128	.922	.128	.0347	.0209	.872
.029	.0091	.0047	.971	.079	.0232	.0130	.921	.129	.0349	.0211	.871
.030	.0094	.0049	.970	.080	.0234	.0132	.920	.130	.0351	.0212	.870
.031	.0097	.0051	.969	.081	.0237	.0133	.919	.131	.0354	.0214	.869
.032	.0100	.0052	.968	.082	.0239	.0135	.918	.132	.0356	.0215	.868
.033	.0103	.0054	.967	.083	.0242	.0137	.917	.133	.0358	.0217	.867
.034	.0106	.0056	.966	.084	.0244	.0138	.916	.134	.0360	.0219	.866
.035	.0109	.0057	.965	.085	.0247	.0140	.915	.135	.0362	.0220	.865
.036	.0112	.0059	.964	.086	.0249	.0141	.914	.136	.0364	.0222	.864
.037	.0115	.0061	.963	.087	.0252	.0143	.913	.137	.0366	.0223	.863
.038	.0118	.0062	.962	.088	.0255	.0145	.912	.138	.0368	.0225	.862
.039	.0121	.0064	.961	.089	.0257	.0146	.911	.139	.0370	.0226	.861
.040	.0124	.0066	.960	.090	.0259	.0148	.910	.140	.0372	.0228	.860
.041	.0127	.0067	.959	.091	.0262	.0150	.909	.141	.0374	.0230	.859
.042	.0130	.0069	.958	.092	.0264	.0151	.908	.142	.0376	.0231	.858
.043	.0133	.0071	.957	.093	.0267	.0153	.907	.143	.0378	.0233	.857
.044	.0136	.0072	.956	.094	.0269	.0154	.906	.144	.0380	.0234	.856
.045	.0139	.0074	.955	.095	.0272	.0156	.905	.145	.0382	.0236	.855
.046	.0141	.0076	.954	.096	.0274	.0158	.904	.146	.0384	.0237	.854
.047	.0144	.0077	.953	.097	.0277	.0159	.903	.147	.0386	.0239	.853
.048	.0147	.0079	.952	.098	.0279	.0161	.902	.148	.0388	.0240	.852
.049	.0150	.0081	.951	.099	.0281	.0163	.901	.149	.0390	.0242	.851
0.050	0.0153	0.0082	0.950	0.100	0.0284	0.0164	0.900	0.150	0.0392	0.0244	0.850
<i>E</i> ₁ '' <i>E</i> ₀ '' <i>n</i>				<i>E</i> ₁ '' <i>E</i> ₀ '' <i>n</i>				<i>E</i> ₁ '' <i>E</i> ₀ '' <i>n</i>			

Formula:

$f_n=f_0+n\Delta_1'+E_0''\Delta_0''+E_1''\Delta_1''$

EVERETT COEFFICIENTS OF THE SECOND DIFFERENCE

The coefficients are always negative

n	E_0''	E_1''	n	E_0''	E_1''	n	E_0''	E_1''			
0.150	0.0394	0.0245	0.850	0.200	0.0482	0.0321	0.800	0.300	0.0597	0.0457	0.700
.151	.0396	.0247	.849	.202	.0485	.0324	.798	.304	.0600	.0462	.696
.152	.0398	.0248	.848	.204	.0488	.0327	.796	.308	.0602	.0467	.692
.153	.0400	.0250	.847	.206	.0491	.0330	.794	.312	.0605	.0472	.688
.154	.0402	.0251	.846	.208	.0493	.0333	.792	.316	.0608	.0476	.684
.155	.0404	.0253	.845	.210	.0496	.0336	.790	.320	.0611	.0481	.680
.156	.0406	.0254	.844	.212	.0499	.0339	.788	.324	.0613	.0486	.676
.157	.0407	.0256	.843	.214	.0502	.0342	.786	.328	.0615	.0490	.672
.158	.0409	.0258	.842	.216	.0505	.0345	.784	.332	.0618	.0495	.668
.159	.0411	.0259	.841	.218	.0508	.0347	.782	.336	.0620	.0499	.664
.160	.0413	.0261	.840	.220	.0510	.0350	.780	.340	.0622	.0503	.660
.161	.0415	.0262	.839	.222	.0513	.0353	.778	.344	.0624	.0508	.656
.162	.0417	.0264	.838	.224	.0516	.0356	.776	.348	.0626	.0512	.652
.163	.0419	.0265	.837	.226	.0519	.0359	.774	.352	.0627	.0516	.648
.164	.0420	.0267	.836	.228	.0521	.0362	.772	.356	.0629	.0520	.644
.165	.0422	.0268	.835	.230	.0524	.0364	.770	.360	.0631	.0524	.640
.166	.0424	.0270	.834	.232	.0526	.0367	.768	.364	.0632	.0528	.636
.167	.0426	.0271	.833	.234	.0529	.0370	.766	.368	.0633	.0532	.632
.168	.0428	.0273	.832	.236	.0531	.0373	.764	.372	.0634	.0536	.628
.169	.0429	.0274	.831	.238	.0534	.0376	.762	.376	.0636	.0540	.624
.170	.0431	.0276	.830	.240	.0536	.0378	.760	.380	.0637	.0544	.620
.171	.0433	.0277	.829	.242	.0539	.0381	.758	.384	.0638	.0547	.616
.172	.0435	.0279	.828	.244	.0541	.0384	.756	.388	.0638	.0551	.612
.173	.0437	.0280	.827	.246	.0543	.0387	.754	.392	.0639	.0555	.608
.174	.0438	.0282	.826	.248	.0546	.0389	.752	.396	.0640	.0558	.604
.175	.0440	.0283	.825	.250	.0548	.0392	.750	.400	.0640	.0562	.600
.176	.0442	.0285	.824	.252	.0550	.0395	.748	.404	.0641	.0565	.596
.177	.0443	.0287	.823	.254	.0553	.0397	.746	.408	.0641	.0568	.592
.178	.0445	.0288	.822	.256	.0555	.0400	.744	.412	.0641	.0572	.588
.179	.0447	.0290	.821	.258	.0557	.0403	.742	.416	.0641	.0575	.584
.180	.0449	.0291	.820	.260	.0559	.0405	.740	.420	.0641	.0578	.580
.181	.0450	.0293	.819	.262	.0561	.0408	.738	.424	.0641	.0581	.576
.182	.0452	.0294	.818	.264	.0563	.0411	.736	.428	.0641	.0584	.572
.183	.0454	.0296	.817	.266	.0565	.0413	.734	.432	.0641	.0587	.568
.184	.0455	.0297	.816	.268	.0567	.0416	.732	.436	.0641	.0590	.564
.185	.0457	.0299	.815	.270	.0569	.0418	.730	.440	.0640	.0593	.560
.186	.0459	.0300	.814	.272	.0571	.0421	.728	.444	.0640	.0595	.556
.187	.0460	.0302	.813	.274	.0573	.0424	.726	.448	.0639	.0598	.552
.188	.0462	.0303	.812	.276	.0575	.0426	.724	.452	.0639	.0601	.548
.189	.0463	.0304	.811	.278	.0577	.0429	.722	.456	.0638	.0603	.544
.190	.0465	.0306	.810	.280	.0579	.0431	.720	.460	.0637	.0606	.540
.191	.0467	.0307	.809	.282	.0581	.0434	.718	.464	.0636	.0608	.536
.192	.0468	.0309	.808	.284	.0582	.0436	.716	.468	.0635	.0610	.532
.193	.0470	.0310	.807	.286	.0584	.0439	.714	.472	.0634	.0613	.528
.194	.0471	.0312	.806	.288	.0586	.0441	.712	.476	.0633	.0615	.524
.195	.0473	.0313	.805	.290	.0588	.0444	.710	.480	.0632	.0617	.520
.196	.0475	.0315	.804	.292	.0589	.0446	.708	.484	.0630	.0619	.516
.197	.0476	.0316	.803	.294	.0591	.0449	.706	.488	.0629	.0621	.512
.198	.0478	.0318	.802	.296	.0593	.0451	.704	.492	.0627	.0622	.508
.199	.0479	.0319	.801	.298	.0594	.0454	.702	.496	.0626	.0624	.504
0.200	0.0479	0.0319	0.800	0.300	0.0594	0.0454	0.700	0.500	0.0626	0.0624	0.500
E_1''	E_0''	n	E_1''	E_0''	n	E_1''	E_0''	n			

This table is intended to be used like a critical table, without interpolation. When so used, the maximum error thus introduced is always less than 0.0005 of the second difference.

BESSELIAN INTERPOLATION COEFFICIENTS

<i>B'' is always negative</i>						<i>B''' is positive for left-hand arguments and negative for right-hand</i>		
<i>n B''</i>			<i>n B''</i>			<i>n B'''</i>		
0.000	1.000		0.050	0.950		0.100	0.900	
.001	0.0001	0.999	.051	0.0120	.949	.101	0.0226	.899
.002	.0004	.998	.052	.0122	.948	.102	.0228	.898
.003	.0006	.997	.053	.0124	.947	.103	.0230	.897
.004	.0009	.996	.054	.0127	.946	.104	.0232	.896
.005	.0011	.995	.055	.0129	.945	.105	.0234	.895
.006	.0014	.994	.056	.0131	.944	.106	.0236	.894
.007	.0016	.993	.057	.0133	.943	.107	.0238	.893
.008	.0019	.992	.058	.0135	.942	.108	.0240	.892
.009	.0021	.991	.059	.0138	.941	.109	.0242	.891
.010	.0024	.990	.060	.0140	.940	.110	.0244	.890
.011	.0026	.989	.061	.0142	.939	.111	.0246	.889
.012	.0028	.988	.062	.0144	.938	.112	.0248	.888
.013	.0031	.987	.063	.0146	.937	.113	.0250	.887
.014	.0033	.986	.064	.0149	.936	.114	.0252	.886
.015	.0036	.985	.065	.0151	.935	.115	.0253	.885
.016	.0038	.984	.066	.0153	.934	.116	.0255	.884
.017	.0041	.983	.067	.0155	.933	.117	.0257	.883
.018	.0043	.982	.068	.0157	.932	.118	.0259	.882
.019	.0045	.981	.069	.0160	.931	.119	.0261	.881
.020	.0048	.980	.070	.0162	.930	.120	.0263	.880
.021	.0050	.979	.071	.0164	.929	.121	.0265	.879
.022	.0053	.978	.072	.0166	.928	.122	.0267	.878
.023	.0055	.977	.073	.0168	.927	.123	.0269	.877
.024	.0057	.976	.074	.0170	.926	.124	.0271	.876
.025	.0060	.975	.075	.0172	.925	.125	.0272	.875
.026	.0062	.974	.076	.0174	.924	.126	.0274	.874
.027	.0064	.973	.077	.0177	.923	.127	.0276	.873
.028	.0067	.972	.078	.0179	.922	.128	.0278	.872
.029	.0069	.971	.079	.0181	.921	.129	.0280	.871
.030	.0072	.970	.080	.0183	.920	.130	.0282	.870
.031	.0074	.969	.081	.0185	.919	.131	.0284	.869
.032	.0076	.968	.082	.0187	.918	.132	.0286	.868
.033	.0079	.967	.083	.0189	.917	.133	.0287	.867
.034	.0081	.966	.084	.0191	.916	.134	.0289	.866
.035	.0083	.965	.085	.0193	.915	.135	.0291	.865
.036	.0086	.964	.086	.0195	.914	.136	.0293	.864
.037	.0088	.963	.087	.0198	.913	.137	.0295	.863
.038	.0090	.962	.088	.0200	.912	.138	.0296	.862
.039	.0093	.961	.089	.0202	.911	.139	.0298	.861
.040	.0095	.960	.090	.0204	.910	.140	.0300	.860
.041	.0097	.959	.091	.0206	.909	.141	.0302	.859
.042	.0099	.958	.092	.0208	.908	.142	.0304	.858
.043	.0102	.957	.093	.0210	.907	.143	.0305	.857
.044	.0104	.956	.094	.0212	.906	.144	.0307	.856
.045	.0106	.955	.095	.0214	.905	.145	.0309	.855
.046	.0109	.954	.096	.0216	.904	.146	.0311	.854
.047	.0111	.953	.097	.0218	.903	.147	.0313	.853
.048	.0113	.952	.098	.0220	.902	.148	.0314	.852
.049	.0115	.951	.099	.0222	.901	.149	.0316	.851
0.050	0.0118	0.950	0.100	0.0224	0.900	0.150	0.0318	0.850
<i>B'' n</i>			<i>B'' n</i>			<i>B'' n</i>		
Formula:			$f_n = f_0 + n\Delta_1' + B'' (\Delta_0'' + \Delta_1'') + B''' \Delta_1'''$			<i>B''' n</i>		
						0.150 +0.0074- 0.850		

B'' is always negative

$$n \quad B'''$$

This table is intended to be used like a critical table, without interpolation. When so used, the maximum errors thus introduced are always less than 0.0004 of the second difference and 0.0002 of the third difference.

FOR COMPUTING THE GEOCENTRIC COORDINATES OF A PLACE

ϕ	C	S	ϕ	C	S
°			°		
0	1.000000	0.993277	45	1.001685	0.994951
1	1.000001	0.993278	46	1.001744	0.995009
2	1.000004	0.993281	47	1.001803	0.995068
3	1.000009	0.993286	48	1.001862	0.995126
4	1.000016	0.993294	49	1.001920	0.995185
5	1.000026	0.993303	50	1.001978	0.995242
6	1.000037	0.993314	51	1.002036	0.995300
7	1.000050	0.993327	52	1.002094	0.995357
8	1.000065	0.993342	53	1.002151	0.995414
9	1.000082	0.993359	54	1.002207	0.995470
10	1.000101	0.993378	55	1.002263	0.995525
11	1.000122	0.993399	56	1.002318	0.995580
12	1.000145	0.993422	57	1.002373	0.995634
13	1.000170	0.993446	58	1.002426	0.995687
14	1.000197	0.993473	59	1.002479	0.995740
15	1.000225	0.993501	60	1.002531	0.995791
16	1.000255	0.993531	61	1.002581	0.995841
17	1.000287	0.993563	62	1.002631	0.995890
18	1.000321	0.993596	63	1.002679	0.995939
19	1.000356	0.993631	64	1.002726	0.995985
20	1.000393	0.993668	65	1.002772	0.996031
21	1.000432	0.993706	66	1.002817	0.996076
22	1.000472	0.993746	67	1.002860	0.996118
23	1.000514	0.993787	68	1.002902	0.996160
24	1.000557	0.993830	69	1.002943	0.996200
25	1.000601	0.993874	70	1.002981	0.996239
26	1.000647	0.993920	71	1.003019	0.996276
27	1.000694	0.993966	72	1.003054	0.996311
28	1.000742	0.994014	73	1.003088	0.996345
29	1.000791	0.994063	74	1.003120	0.996377
30	1.000841	0.994113	75	1.003151	0.996407
31	1.000893	0.994164	76	1.003180	0.996436
32	1.000945	0.994216	77	1.003207	0.996462
33	1.000999	0.994269	78	1.003232	0.996487
34	1.001053	0.994323	79	1.003255	0.996510
35	1.001108	0.994378	80	1.003276	0.996531
36	1.001163	0.994433	81	1.003295	0.996550
37	1.001220	0.994489	82	1.003313	0.996568
38	1.001277	0.994545	83	1.003328	0.996583
39	1.001334	0.994602	84	1.003341	0.996596
40	1.001392	0.994660	85	1.003353	0.996607
41	1.001450	0.994717	86	1.003362	0.996617
42	1.001508	0.994776	87	1.003369	0.996624
43	1.001567	0.994834	88	1.003374	0.996629
44	1.001626	0.994892	89	1.003377	0.996632
45	1.001685	0.994951	90	1.003378	0.996633

$\rho \cos \phi' = (C+H) \cos \phi$
 $\rho \sin \phi' = (S+H) \sin \phi$
 $H = 0.1567794 \times 10^{-6} \times \text{elevation in meters}$
 $H = 0.0477865 \times 10^{-6} \times \text{elevation in feet}$

ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC

The sources of the data used in the construction of the *American Ephemeris and Nautical Almanac* are enumerated in the *Introduction*, pages vii-ix; the values adopted for the fundamental constants are listed on pages xvi-xvii.

Unless otherwise stated, the unit of mass is the mass of the Sun; the unit of time is the mean solar day; and the unit of length is the astronomical unit, i. e., the unit of distance in terms of which, in KEPLER's Third Law $n^2a^3=k^2(1+m)$, the semimajor axis a of an elliptic orbit must be expressed in order that the numerical value of the Gaussian constant k may be exactly 0.01720209895 when the unit of time is the mean solar day. In astronomical units, the mean distance of the Earth from the Sun, calculated by KEPLER's Law from the observed mean motion n and adopted mass m , is 1.0000 0003 (NEWCOMB).

Except where otherwise stated, the time used is mean solar time of the meridian of Greenwich, reckoned from midnight, which is known as Universal Time; and it is in accordance with the system of time measurement determined by the adopted right ascension of the fictitious mean sun in NEWCOMB's *Tables of the Sun*. The fictitious mean sun is an imagined body, defined by its adopted right ascension, that moves uniformly along the mean celestial equator of date at a constant sidereal rate which, although adopted by convention, is virtually equal to the *mean* rate of the apparent annual motion of the actual Sun in the ecliptic; and the measure of time given by the diurnal motion of the fictitious mean sun is *Mean Solar Time*. Beginning with 1956, in accordance with resolutions of the International Astronomical Union, determinations of Universal Time have been corrected for the annual variation in the rate of rotation of the Earth, and for the variation in the position of the meridian due to the motion of the terrestrial pole.

The mean solar day is the interval of time between two consecutive upper transits or two consecutive lower transits of the fictitious mean sun across a local meridian that preferably is defined as the actual meridian corrected for the variations which occur in its position because of the motion of the terrestrial pole and because of lunisolar variations of the vertical. The Civil Day is the interval between the two *lower* transits, i. e., it is a mean solar day that begins at midnight, and Civil Time is mean solar time reckoned from midnight; the Local Civil Time at any instant is the local hour angle of the fictitious mean sun plus 12 hours, measured positively westward. Greenwich Civil Time is identical with Universal Time.

Civil Time has been used in the *American Ephemeris and Nautical Almanac* beginning with the volume for 1925. In the volumes before 1925, the mean solar day determined by successive *upper* meridian transits of the mean sun was used; this mean solar day, which begins at noon, is called the Astronomical Day, and mean solar time reckoned from noon is Astronomical Time; it is the hour angle of the mean sun. The Civil Day begins 12 hours *before* the Astronomical Day of the same date; e. g., January 1.0, 1925, in the volume for 1925 is the same instant as December 31.5, 1924, in the volume for 1924.

Mean solar time, when referred to a meridian which is corrected for polar motion and for variations of the vertical, is a uniform measure of time except for the secular, irregular, and annual variations that occur in the rate of rotation of the Earth, because by definition the annual motion of the imagined fictitious mean sun is at a constant sidereal rate and along the equator, and therefore its motion in hour angle relative to the corrected meridian is uniform unless the rotation of the Earth varies. In this respect it differs from the motion of the actual Sun in hour angle, which is variable owing both to the obliquity of the

ecliptic and to the numerous inequalities in the apparent annual motion of the Sun. The measure of time given by the diurnal motion of the true Sun is called *Apparent Solar Time*, and is shown by a sundial; it is not uniform, and the length of the apparent solar day determined by successive meridian transits of the Sun is variable. However, the right ascension of the fictitious mean sun is very nearly equal to the *mean longitude* of the true Sun affected by aberration—differing by only a slight, progressively increasing, excess $0^s.0203 T^2$ due to the secular acceleration of the true Sun (T denoting Julian centuries from 1900); and therefore the uniform motion of the mean sun in hour angle is closely equal to the *average* rate of motion of the actual Sun in hour angle. On the average the fictitious mean sun virtually coincides with the true Sun, but on any particular occasion it is in general either somewhat ahead of or behind the true Sun. The difference in hour angle between the true Sun and the fictitious mean sun is the Equation of Time; its numerical value varies from 0 to about 16 minutes, and is given for 0^h of each day in the ephemeris of the Sun.

Mean solar time cannot be directly determined by observation. It may be obtained from apparent solar time by correcting observations of the Sun for the equation of time; but when high precision is required, the mean solar time is obtained by calculation from its relation to sidereal time. Sidereal time is the measure of time defined by the diurnal motion of the vernal equinox, and is determined from observations of meridian transits of stars; because of the accuracy with which it may be determined by observation, sidereal time is the primary astronomical measure of time.

The *true* equinox is the intersection of the true equator of date with the ecliptic of date, and the time measured by its diurnal motion is *Apparent Sidereal Time*; since the true equinox is affected by nutation, there are small irregularities in apparent sidereal time and in the length of the sidereal day. Time measured by the diurnal motion of the *mean* equinox of date, which is affected by only secular inequalities, is known as *Mean Sidereal Time*; apparent sidereal time minus mean sidereal time is the nutation in right ascension. The sidereal day is the interval of time between two consecutive upper transits of the vernal equinox across a local meridian; it is divided into 24 sidereal hours, reckoned from upper transit (sidereal noon), and the sidereal time is the hour angle of the vernal equinox. Because of the precessional and nutational motions of the equinox, the sidereal day is not exactly the same as the period of rotation of the Earth, and strictly it would better be called an equinoctial day. In practice, the inequalities in the hour angle that are due to variations of the vertical may be neglected, because they are too small in comparison with errors of observation to be significant except in an analysis of a long series of observations; but because of the high accuracy that has been reached in timekeeping, the inequalities due to the polar motion and to the annual variation in the rate of rotation have become of practical importance in time determination.

The relation of sidereal time to mean time is:

$$(\text{Local Sidereal Time}) - (\text{Local Astronomical Mean Time}) = \text{R. A. of fictitious mean sun};$$

hence the Greenwich Apparent Sidereal Time at 0^h Universal Time is the Right Ascension of the mean sun $+12^h$, and its adopted expression is

$$6^h 38^m 45^s.836 + 8\ 640\ 184^s.542 T + 0^s.0929 T^2 + \text{nutation in R. A.},$$

where T denotes Julian centuries since 1900 January 0, Greenwich Mean Noon. The sidereal time at each Greenwich mean midnight, calculated from this expression, is given in the ephemeris of the Sun; with this ephemeris, the sidereal time determined by observations of stars may be converted to mean solar time by the procedure described on page 565.

This system of measuring and determining time is in principle equivalent to actual observation of the diurnal motion of the fictitious mean sun, since this diurnal motion is the

resultant of the adopted unvarying sidereal motion of the mean sun and the rotational motion of the Earth around its instantaneous axis which is reflected in the observed apparent diurnal motion of the stars. The mean solar day, when determined by observations corrected for only the variations of the meridian, is rigorously proportional to the period of rotation of the Earth. Because of the variations in the rate of rotation, the mean solar day is therefore not of invariable length; and the correction for the annual variation alone which is applied in determining Universal Time does not wholly eliminate the variability. In the fundamental tables constructed from dynamical theory, from which astronomical ephemerides are computed, the argument is the uniform measure, in terms of invariable units, dynamically defined by NEWCOMB'S *Tables of the Sun*. This uniform measure has been termed Ephemeris Time by the International Astronomical Union; at any particular instant, it will differ from Universal Time at that instant by the accumulated effects of the secular and irregular variations that occur in the rate of rotation of the Earth. To the extent that these effects are appreciable, the tabular positions at a tabular time will depart from the observed positions at the numerically equal mean solar time; however, only in the calculations of eclipses and occultations is any allowance made for this, or for any other corrections to the Tables enumerated in the *Introduction* (see pages viii-ix).

From an analysis of the departures of the observed positions of the Sun, Moon, and planets from their tabular positions, the lengths of the mean solar day at different epochs may be found in units of the mean tropical year corrected for the gravitational secular acceleration of the mean motion of the Earth; and the correction required to reduce Universal Time to Ephemeris Time may then be determined. When in discussing observations the greatest precision is desired, this correction should be made to the times of the observations. Where the variation in the length of the mean solar day from one epoch to another causes effects which it is desired to avoid, a particular mean solar day, such as the day obtained by averaging the mean solar days over the nineteenth century, is commonly adopted as the unit; this is done, e. g., in Kepler's Third Law to make the astronomical unit invariable. The second of Ephemeris Time, defined as $1/31\,556\,925.975$ of the tropical year for 1900.0 has been adopted as the fundamental invariable unit of time by the International Astronomical Union and the International Committee on Weights and Measures.

In the ephemerides, the hours of the Civil Day are counted from 0 to 24. As ordinarily used in civil life, they are counted from 0 to 12 in two series; the first series, designated A. M., extends from midnight to noon, and the second, designated P. M., from noon to midnight.

On any particular meridian of longitude, the local time, either solar or sidereal, is more advanced than at the same instant on any meridian farther west, and less advanced than on any meridian farther east; the difference amounts to one hour for each 15° difference in longitude. For civil purposes, however, clocks are customarily regulated to the same time throughout an entire zone of longitude about 15° wide; in particular, the United States is divided into four time zones, and the clock time kept throughout each zone is the local civil time of a selected standard meridian near the middle of the zone. Time in this system is known as Standard Time. The four standard meridians in the continental United States are at west longitudes 75° , 90° , 105° , and 120° ; the local times on these meridians are respectively known as Eastern, Central, Mountain, and Pacific Standard Time, and are less advanced than Universal Time by 5^h , 6^h , 7^h , and 8^h respectively. The boundaries of the zones are fixed by the Interstate Commerce Commission, in accordance with an act of Congress dated March 19, 1918; they are irregular, and subject to occasional modification, and do not always correspond to the time actually in use at a particular place, but adoption by local legislation of a different time does not alter the boundaries of the

time zones. It is now common practice in some localities to advance the clock time one or more hours during the summer; this advanced time is known in the United States as Day-light Saving Time.

The extension of the system of Standard Time completely over the Earth is known as Zone Time. The standard meridians of the international time zones are 15° apart, beginning with the Greenwich meridian; and each zone is designated by the number of hours to be added algebraically to the Zone Time in order to obtain Universal Time. For example, the Eastern Standard Time zone is Zone $+5^h$. Zone $+12^h$ and Zone -12^h each extends only to the International Date Line, which is everywhere along or near the 180th meridian; when the Date Line is crossed from east to west, the time is advanced by exactly 24 hours, i. e., the date abruptly increases by one day, with an additional change at places where the Date Line coincides with a time zone boundary.

Over extended intervals, civil time-reckoning is ordinarily according to conventional calendar years and adopted historical eras; in the construction and regulation of calendars, and in fixing many ecclesiastical observances, a number of auxiliary cycles and periods are used. The principal chronological eras, cycles, and anniversaries are enumerated on pages xiv–xv; and the Gregorian calendar for the current year is given on pages x–xiii. A continuous count of days according to the Julian Day Number is given in *Tables IX* and *IXA*, pages 548–551.

For some astronomical purposes, a reckoning by tropical years is advantageous; for this purpose the tropical year is considered to begin at the instant when the right ascension of the fictitious mean sun is $18^h 40^m$; the tropical year reckoned in this way is known as the Besselian year. In 1958, the Besselian year begins January $0^d.861$ Universal Time; and this instant is denoted by the notation 1958.0.

PART I—SUN, MOON, AND PLANETS

In addition to providing the fundamental ephemerides for the preparation of navigational almanacs and other derived ephemerides, one of the principal purposes of this section is for the exact comparison of theory with observation, for the purpose of more accurately determining astronomical constants and establishing the location of the equinox and equator among the stars, in order to improve astronomical theories and tables. Except where otherwise stated, the tabular positions are therefore *apparent* positions, i. e., the positions in which the Sun, Moon, and planets would actually be seen from the center of the Earth at the tabular times according to the fundamental tables and constants cited in the *Introduction*, relative to the coordinate systems determined by the instantaneous equator, ecliptic, and equinox.

The coordinates at instants other than the tabular times may be obtained by interpolation with the requisite order of differences. For this purpose, differences or variations are included in many of the ephemerides; and formulas and tables for interpolation are given on pages 556–559.

EPHEMERIS OF THE SUN

Pages 2–17 contain for 0^h of each day the *Apparent Right Ascension*, *Apparent Declination*, *Semidiameter*, *Horizontal Parallax*, *True Longitude* and *Latitude of the Sun*, the *Radius Vector of the Earth*, the *Precession in Longitude*, the *Nutation in Longitude*, the *Nutation in Right Ascension*, the *Equation of Time*, and the *Sidereal Time (Right Ascension of Mean Sun $+12^h$)*. They also contain the *Civil Time of Sidereal 0^h* , the *Day of the Week* and the *Day of the Year*.

It is to be noted that here, as elsewhere throughout this volume, the positive sign used with declinations or latitudes indicates north and the negative sign south.

The Sun's *Apparent Right Ascension* and *Declination* are affected both by aberration and by the long period terms of nutation, and therefore denote the *apparent* position of the *true* Sun. The Sun's *True Longitude* is the true geometric longitude not affected by aberration; it is referred to the mean equinox of 1950.0, and the correction required to obtain the longitude referred to the mean equinox of the beginning of the year is given at the bottom of the page.

The Sun's *Latitude* is referred both to the ecliptic of the beginning of the year, and to the ecliptic of 1950.0.

The *Horizontal Parallax* is the angle subtended at the center of the Sun by the equatorial radius of the Earth.

The *Precession in Longitude* is the quantity to be applied to the longitude of the Sun referred to the mean equinox of the beginning of the Besselian year, in order to refer it to the mean equinox of date.

The *Nutation in Longitude* is the quantity to be applied to the longitude of a body referred to the mean equinox of date in order to refer it to the true equinox, short period terms being neglected. The correction to the value of the nutation here given, to take account of the short period terms, may be found on pages 252–259.

The *Nutation in Right Ascension* is the quantity to be applied to the right ascension referred to the mean equinox of date of a body in the equator in order to refer it to the true equinox. The effect of short period terms is included.

The *Equation of Time, App.–Mean*, is the correction to be applied to mean time in order to obtain apparent time.

The *Sidereal Time of 0^h* is the right ascension of the mean Sun plus 12 hours, at 0^h Universal Time, referred to the true equinox of date. The terms of short period of nutation have been included.

Uniform sidereal time is obtained by subtracting the nutation in right ascension from the tabulated sidereal time. It may be reduced for the longitude or to any given Universal Time by using the hourly variation, $+9^{\circ}.8565$, or the reduction may be taken from Table III of this volume. It can be used for converting civil time to sidereal time by adding to the local uniform sidereal time of 0^h the equivalent in sidereal time of the local civil time. To obtain true sidereal time add also the nutation in right ascension interpolated for the given time. An example is given on page 567.

The sidereal time of 0^h, reduced for the longitude of the place, is also used in converting sidereal time to civil time. Subtracting the reduced value from the given sidereal time gives the interval of sidereal time past 0^h, and that is converted into the required civil time by subtracting from it the corresponding reduction of the sidereal time interval to the mean time interval. This reduction may be found by multiplying $-9^{\circ}.8296$ by the sidereal time interval expressed in hours and parts of an hour, or it may be taken from Table II of this volume. If the sidereal interval is less than $3^{\text{m}} 56^{\text{s}}.5$, there are two civil times corresponding to the given sidereal time, one a few minutes after the preceding 0^h, and the other a few minutes before the following 0^h, the mean time interval between these two civil times being about $23^{\text{h}} 56^{\text{m}} 04^{\text{s}}$. The civil time, approximately known, will always show which one is to be taken. An example is given on page 567.

The *Civil Time of Sidereal 0^h* is the number of hours, minutes, and seconds after 0^h Universal Time when the vernal equinox passes the meridian of Greenwich. The terms of short period of nutation have been included. It may be reduced to any other meridian by using the hourly variation, $-9^{\circ}.8296$, or the reduction may be taken from Table II. In the same way the reduction may be made to any Greenwich sidereal time, and the result will then represent 12^h–Right Ascension of the Mean Sun. This column may be conveniently used for converting sidereal to civil time, or—which is the same problem—for finding the time of meridian passage of a star whose right ascension is known, by adding to the civil time of the *preceding* local sidereal 0^h, the mean time equivalent of the given sidereal time.

EXAMPLES

As examples of the use of pages 2-17:

1. Let the Sun's declination be required for April 14, 1958, 2^h 05^m 20^s, P. M., at a place whose longitude is 58° 20', or 3^h 53^m 20^s west of Greenwich.

Local civil time	April 14,	^h 14 ^m 05 ^s 20
Longitude from Greenwich (additive)		3 53 20
Universal Time	April 14,	17 58 40

Reducing the hours, minutes, and seconds to decimals of a day, we find that this moment is 0.74907 of a day after 0^h April 14, or 0.25093 of a day before 0^h April 15. On page 6 of the Ephemeris we find that the change in declination from April 14, 0^h to April 15, 0^h is +1298'' .4, and the double second difference is - 18'' .4. Using Bessel's interpolation formula, and Table XIV, we have—

+1298.4×+0.74907	+	972.59
-18.4×-0.0470	+	0.86
Change in +0.74907 of a day		+16' 13'' .4
Declination April 14 ^d 00 ^h , U. T.		[°] +9 08 ['] 35.7 ^{''}
Declination, April 14 ^d 17 ^h 58 ^m 40 ^s , U. T.		+9 24 49.1

With equal facility the computation might have been made backward from 0^h, April 15, as follows:

+1298.4×-0.25093	-	325.81
-18.4×-0.0470	+	0.86
Change in -0.25093 of a day		- 5' 25'' .0
Declination, April 15 ^d 00 ^h , U. T.		[°] +9 30 ['] 14.1 ^{''}
Declination, April 14 ^d 17 ^h 58 ^m 40 ^s , U. T.		+9 24 49.1

It will always be well to make the calculation in both ways, as a check.

2. Let the Sun's right ascension and the equation of time be required for July 7, 1958, 4^h 03^m 30^s, A. M., at a place whose longitude is 85° 15', or 5^h 41^m west from Greenwich.

Local civil time	July 7,	^h 4 ^m 03 ^s 30
Longitude from Greenwich (additive)		5 41 00
Universal Time	July 7,	9 44 30
The time is, therefore, 0.40590 of a day after 0 ^h of July 7.		

	<i>Sun's Right Ascension</i>		<i>Equation of Time</i>	
July 7 ^d 00 ^h , U. T.	^h 7 ^m 02 ^s 27.57		^m -4 ^s 38.28	
+246°.33×+0.40590	+1 39.985	-9°.77×+0.40590	-3.966	
-0.71×-0.0603	+0.043	+0.70×-0.0603	-0.042	
July 7 ^d 09 ^h 44 ^m 30 ^s , U. T.	7 04 07.60		-4 42.29	

3. Let the sidereal time be required for the same time and place. Subtracting the nutation in right ascension, page 11, from the true sidereal time, page 10, we have—

Uniform sidereal time 0 ^h , U. T., July 7	18 ^h 57 ^m 48. ^s 754
Reduction for longitude, 5 ^h 41 ^m (Table III)	+56.018
Local civil time	4 03 30.000
Reduction for 4 ^h 03 ^m 30 ^s (Table III)	+40.001
Local uniform sidereal time	23 02 54.773
Nutation in right ascension, July 7. 406, U. T.	+0.535
Local true sidereal time	23 02 55.308

4. On July 7, 1958, at approximately 4 A. M., at a place whose longitude is 5^h 41^m 00^s west, suppose the true sidereal time to be 23^h 02^m 55^s.308, and that the corresponding civil time is required. The Universal Time is approximately 10^h, and the nutation in right ascension at that time is +0^s.535. Therefore the local uniform sidereal time is 23^h 02^m 54^s.773.

Uniform sidereal time 0 ^h , U. T., July 7	18 57 48.754
Reduction for longitude, 5 ^h 41 ^m (Table III)	+56.018
Uniform sidereal time of 0 ^h , local civil time	18 58 44.772
Given uniform sidereal time	23 02 54.773
Sidereal interval from 0 ^h , local civil time	4 04 10.001
Reduction for 4 ^h 04 ^m 10 ^s .001 (Table II)	-40.001
The required local civil time	4 03 30.000

SUN'S LATITUDE, ECLIPTIC OF DATE

Page 18 contains for 0^h of every day the *Latitude of the Sun* referred to the ecliptic of date.

OBLIQUITY, SUN'S ABERRATION AND MEAN LONGITUDE

Page 19 contains for 0^h of every fifth day the *True Obliquity of the Ecliptic*, the *Sun's Aberration*, and the *Sun's Mean Longitude*. The Mean Longitude is not affected by aberration.

The *True Obliquity* is the inclination of the Earth's equator to the ecliptic, short period terms being neglected. The correction to the value of the obliquity here given, to take account of short period terms, may be found on pages 252-259.

The *Aberration* is the quantity to be subtracted from the true longitude of the Sun in order to obtain its apparent longitude.

RECTANGULAR COORDINATES OF THE SUN

Pages 20-27 contain the rectangular coordinates of the Sun, referred to the center of the Earth as the origin, and to the mean equator and equinox of the beginning of the year as the plane and point of reference. Pages 28-35 contain the rectangular coordinates of the Sun referred to the mean equator and equinox of 1950.0.

Each coordinate is given for 0^h of each day, and to facilitate interpolation their first and second differences are given. Everett's formula, for which the coefficients are given in Table XIII, pages 556-557, is the most convenient for this interpolation.

The dates for which the integral part of the Julian Day Number is divisible by 10 are indicated by the use of bold face type. These are the standard 10-day ephemeris dates recommended by the International Astronomical Union.

EPHEMERIS OF THE MOON

Pages 36–127 contain *The Moon's Right Ascension* and *Declination* for each day and hour, referred to the true equator and equinox, short period terms being neglected, together with their hourly differences for use in interpolation.

Let the Moon's right ascension and declination be required for January 2, 1958, at 10^h 22^m 35^s, Universal Time. Reducing the minutes and seconds to decimals of an hour, we find that this moment is 0.37639 of an hour after 10^h. The first differences in right ascension and declination are +134^s.51 and +258^{''}.9, respectively, and the double second differences are +0^s.54 and –11^{''}.1, respectively.

	Right Ascension			Declination		
	h	m	s	°	'	"
January 2, 10 ^h	3	47	38.76	+18	10	22.4
+134 ^s .51×0.37639		+ 50.628	+258 ^{''} .9×0.37639		+1	37.45
+ 0.54×–0.0588		– 0.032	– 11.1×–0.0588			+ 0.65
January 2, 10 ^h 22 ^m 35 ^s	3	48	29.36	+18	12	00.5

Page 127 contains also the *Phases of the Moon* and the times of the *Moon's Apogee* and *Perigee*, or the greatest and least distances from the Earth. The times of *New Moon*, *First Quarter*, *Full Moon* and *Last Quarter* are the times at which the excess of the Moon's longitude over the Sun's apparent longitude is 0°, 90°, 180°, and 270°, respectively.

Pages 128–143 contain for 0^h and 12^h of each day the *Moon's Longitude* and *Latitude* referred to the true equinox and ecliptic, short period terms being neglected, its *Semidiameter*, and its *Horizontal Parallax*. Its *Age*, or the time elapsed since the preceding New Moon, is given for 0^h of each day. The data contained on these pages may be interpolated to any other time in the manner shown in the preceding examples.

These pages contain also the time of the *Moon's Transit*, *Upper* and *Lower*, at Greenwich, given to tenths of a minute, with their differences. These differences represent the change in the *local* time of transit corresponding to a change of 12 hours in longitude, and by means of them the local time of an upper or lower transit of the Moon may be computed for any place for which the longitude is known.

EPHEMERIDES OF THE PLANETS

Pages 144–223 contain for each of eight principal planets the geocentric ephemeris, followed immediately by the heliocentric ephemeris.

The geocentric ephemeris for each planet except Pluto gives the planet's *Apparent Right Ascension* and *Apparent Declination*, referred to the true equator and equinox of date, and affected by aberration. The geocentric ephemeris gives also the *True Distance from Earth*, the planet's *Semidiameter* and *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*. All the data, except the last named, are given for 0^h. By means of the differences of the Greenwich times of transit, the local times of transit may be computed for any place for which the longitude is known. Short period terms are neglected.

The heliocentric ephemeris for each planet except Pluto gives the *Heliocentric Longitude*, *Mean Equinox of Date*; the *Heliocentric Latitude*; and the *Logarithm of Radius Vector*. The heliocentric longitude may be referred to the true equinox by applying nutation. The column *Reduction to Orbit* contains the correction to be applied to the heliocentric longitude in order to obtain the longitude measured along the orbit of the planet. This orbit longitude is equal to the distance from the mean equinox to the node, plus the distance from the node to the planet. The heliocentric latitude is referred to the ecliptic of date. The *Logarithm of Radius Vector* is the logarithm of the distance of the center of the planet from that of the Sun. All the data are given for 0^h.

The geocentric ephemeris of Pluto gives the *Astrometric Right Ascension* and *Declination*, referred to the mean equator and equinox 1950.0, the *True Distance from Earth*, the *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*.

The astrometric ephemeris is obtained by adding the planetary aberration to the geometric ephemeris and then subtracting the fixed-star aberration, calculated by the conventional formula which neglects the portion depending on the longitude of the Earth's perihelion. The astrometric ephemeris therefore is rigorously comparable with observations that are referred to catalogue mean places of neighboring stars, it being only necessary to correct the observations for geocentric parallax.

The heliocentric ephemeris of Pluto gives the *Heliocentric Longitude, Mean Equinox 1950.0*; the *Heliocentric Latitude, Ecliptic 1950.0*; and the *Logarithm of Radius Vector*. The reduction to the orbit refers to the instantaneous orbit of the date. If applied to the heliocentric longitude it gives the orbital longitude measured from the mean equinox of 1950.0 along the ecliptic of 1950.0 to the instantaneous node, and thence along the instantaneous orbit to the planet.

Pages 224–243 contain geocentric ephemerides of the minor planets Ceres, Pallas, Juno, and Vesta, for the periods during which they transit the meridian when the Sun is below the horizon, between latitudes $+56^\circ$ and -34° . The ephemeris of each planet gives the *Apparent Right Ascension and Declination*, the reductions to *Astrometric Right Ascension and Declination* referred to the mean equinox and equator 1950.0, the *True Distance from Earth*, the *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*; and the dates are indicated on which the lunar inequality is a maximum in Right Ascension.

In both the geocentric and the heliocentric ephemerides of the planets, either the first differences or the variations per day of the various quantities are given wherever they may be needed to facilitate interpolation.

PART II—STARS

Pages 246–247 contain formulas for reducing mean positions of stars to apparent positions, including expressions for the Besselian star numbers and star constants, and for the independent star numbers; the whole based upon the constants of the Paris Conference of May 1896, and expressed in the notation of BESSEL.

Pages 248–251 contain the logarithms of the *Besselian Star Numbers*, A, B, C, D , with the values of E appended at the bottoms of the pages. The terms of short period have been included. These numbers serve to reduce the mean place of a star at the beginning of the Besselian year to its apparent place at any of the dates for which the numbers are given.

Pages 252–259 contain the natural *Besselian Star Numbers*, short period terms being included.

These pages contain also the *Terms of Short Period in Nutation* in longitude and obliquity, $d\psi$ and de .

The following is an example of the reduction of a star to apparent place by the Besselian star numbers:

Computation of the apparent place of α^2 Libræ, Feb. 20, 1958, for the upper transit at Greenwich

$\log a$	0.5222	$\log b$	8.1477	$\log c$	8.7109 n	$\log d$	8.6675 n
$\log A$	9.5583	$\log B$	0.8600	$\log C$	1.2157 n	$\log D$	0.9959
$\log a'$	1.1720 n	$\log b'$	9.8267	$\log c'$	9.3688	$\log d'$	9.3069
$\log Aa$	0.0805	$\log Bb$	9.0077	$\log Cc$	9.9266	$\log Dd$	9.6634 n
$\log Aa'$	0.7303 n	$\log Bb'$	0.6867	$\log Cc'$	0.5845 n	$\log Dd'$	0.3028
Mean Place, 1958.0				α_o	h m s 14 48 33.011	δ_o	° ' " -15 52 06.21
				Aa	+1.204	Aa'	-5.37
				Bb	+0.102	Bb'	+4.86
				Cc	+0.844	Cc'	-3.84
				Dd	-0.461	Dd'	+2.01
				E	+0.002	$\tau\mu'$	-0.01
				$\tau\mu$	-0.001		
Apparent Place, Feb. 20.201				α	14 48 34.70	δ	-15 52 08.6

Pages 260-267 contain the *Independent Star Numbers*, which can frequently be advantageously used instead of the *Besselian Star Numbers*. The terms of short period have been included. These quantities are connected with those of Bessel by the relations given on page 246 which also contains the formulas and precepts for the application of both systems of numbers. In order to use the Besselian numbers, it is necessary to have the values of the star constants, $a, b, c, d, a', b', c', d'$, while the independent star numbers render it possible to determine the apparent place of a star without computing these star constants. The column τ gives the fraction of a year, counted from the beginning of the Besselian year to 0^h of each date.

The following is an example of the reduction of a star to apparent place by the independent star numbers:

Computation of the apparent place of α^2 Libræ Feb. 20, 1958, for the upper transit at Greenwich

	h m				° ' "
$G=$	2 59.9			$\delta_o=-$	15 52.1
$\alpha_o=$	14 48.6			$G+\alpha_o=$	17 ^h 48 ^m .5
$H=$	20 04.4			$H+\alpha_o=$	10 ^h 53 ^m .0
$\log \frac{1}{r^2}$	8.8239	$\log \frac{1}{r^2}$	8.8239	α_o	14 48 33.011
$\log g$	1.0107	$\log h$	1.2831	$f+f'$	+1.113
$\log \sin (G+\alpha_o)$	9.9995 <i>n</i>	$\log \sin (H+\alpha_o)$	9.4597	(g)	+0.194
$\log \tan \delta_o$	9.4537 <i>n</i>	$\log \sec \delta_o$	0.0169	(h)	+0.383
$\log (g)$	9.2878	$\log (h)$	9.5836	$\tau\mu$	-0.001
				α	14 48 34.70
					° ' "
$\log g$	1.0107	$\log h$	1.2831	δ_o	-15 52 06.21
$\log \cos (G+\alpha_o)$	8.7003 <i>n</i>	$\log \cos (H+\alpha_o)$	9.9812 <i>n</i>	(g')	-0.51
$\log (g')$	9.7110 <i>n</i>	$\log \sin \delta_o$	9.4368 <i>n</i>	(h')	+5.02
		$\log (h')$	0.7011	(i)	-6.85
$\log i$	0.8528 <i>n</i>			$\tau\mu'$	-0.01
$\log \cos \delta_o$	9.9831				
$\log (i)$	0.8359 <i>n</i>			δ	-15 52 08.6

Page 268 contains for every tenth sidereal day the *Besselian* and *Independent Star Numbers*, exclusive of all short period terms.

Pages 269-304 contain the *Mean Places of Stars* for the beginning of the Besselian year. These pages give also the magnitude, spectral type, annual variations, and proper motions for each star. The annual variations are to be considered as the differential coefficients of each coordinate with respect to the time at the middle of the year.

The footnotes on these pages contain information in regard to certain of the stars, including the magnitudes, distances, and position angles of the companions of bright doubles.

PART III—ECLIPSES AND OCCULTATIONS

ECLIPSES

Pages 306–314 contain all necessary data respecting the solar and lunar eclipses which occur during the year.

The solar eclipse elements on pages 306–307 are given for the moment of conjunction of the Sun and Moon in right ascension. The principal circumstances of each total and annular eclipse of the Sun are stated in five lines, as follows:

The line entitled “Eclipse begins” gives the time at which the Moon’s penumbra first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled “Central eclipse begins” gives the time when the axis of the Moon’s shadow first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled “Central eclipse at local apparent noon” gives the time when the axis of the Earth and that of the shadow cone lie in the same plane, and the latitude and longitude of the point where the axis of the shadow cone then cuts the Earth’s surface.

The lines entitled “Central eclipse ends” and “Eclipse ends” give, respectively, the times when and the localities where these events occur.

In the case of partial solar eclipses the axis of the Moon’s shadow does not come into contact with the Earth, and the three lines entitled, respectively, “Central eclipse begins”, “Central eclipse at local apparent noon”, and “Central eclipse ends”, are replaced by a single line entitled “Greatest eclipse”, wherein are given the time when and the latitude and longitude where the eclipse attains its greatest magnitude. The latter phenomenon necessarily occurs with the Sun in the horizon.

For years in which one or more eclipses of the Moon occur these pages also contain the elements of each eclipse for the time of opposition of the Sun and Moon in right ascension and the circumstances, which include the times of the first and last contacts of the Moon with the Earth’s penumbra and umbra, and the time of the middle of the eclipse. If the eclipse is total the time of beginning and ending of the total phase is also given. The position angle of first and last contact of the Earth’s umbra with the Moon’s limb and the geographical position of the place at which the Moon appears in the zenith at first and last contact, respectively, and the magnitude of the greatest eclipse (Moon’s diameter = 1.0) are also given.

Maps of the Eclipses.—The regions in which an eclipse is visible are shown upon the map relating to it, from which may be taken approximately, for any place, both the times of the beginning and ending of the eclipse and its magnitude. The dotted curves show the outline of the shadow for each hour, and therefore pass through all places where the eclipse begins or ends at the hour indicated. To find the instant of beginning at any place, we determine by inspection between what two consecutive hour curves the place is situated. The eclipse will then begin between the corresponding hours; and the fraction of the hour may be determined by dividing the hour in the same proportion as the space representing it on the map is divided by the place in question. In a similar manner the approximate time of ending may be obtained. The Universal Time thus found may be reduced to local civil time by applying the longitude.

As an example, suppose we wish to find the times at which the eclipse of October 12, 1958, begins and ends at Pukapuka, Line Islands, latitude $-10^{\circ} 48'$, longitude $+166^{\circ} 00'$.

For the beginning we compare the distance of the place from the curves of $18^h 30^m$ and $19^h 00^m$, and find it to correspond to 10 minutes from the former, thus giving for the approximate time of beginning $18^h 40^m$; for the end we compare the distance of the place from the curves of $21^h 00^m$ and $22^h 00^m$, and find it to correspond to 10 minutes from the former, thus giving for the approximate time of ending $21^h 10^m$; and both of these results are probably correct to within 4 or 5 minutes.

Changing to local civil time, we shall have

		Beginning			Ending		
		d	h	m	d	h	m
Universal Time	October	12	18	40	12	21	10
Longitude west			11	04		11	04
Local civil time		12	07	36	12	10	06

In the case of total and annular eclipses, a fair estimate of the magnitude of the eclipse at any place may be obtained from the position thereof relative to the central line and to the limit. On the central line the eclipse is annular or total, while at the limit the magnitude of the eclipse is zero; therefore at any place between the central line and the limit the maximum magnitude of the eclipse is given by the quotient of the distance of the place from the limit divided by the distance of the central line from the limit, the measurements being made upon a line through the place perpendicular to the central line.

More Accurate Computations.—A more accurate determination of the phases, as visible at any point of the Earth's surface, may be obtained from the Besselian elements, which are given for every 10 minutes. Their geometric significance is as follows:

Let us imagine a plane passing through the center of the Earth, perpendicular to the line joining the centers of the Sun and Moon. This line is the axis of the Moon's shadow, and the plane is called the *fundamental plane* or plane of xy . The axis of x is the intersection of this plane with that of the Earth's equator, the positive direction being toward the east; the center of the Earth is the origin of coordinates. The axis of y is perpendicular to that of x , and directed toward the north; x and y are then the coordinates of the point in which the axis of the shadow intersects the fundamental plane, and they are here expressed in terms of the Earth's equatorial radius as the unit. The axis of z is parallel to the shadow axis, positive toward the Moon and Sun. The angle d , of which the sine and cosine are given, is the declination of the point on the celestial sphere toward which the positive z axis, and likewise the axis of the shadow, are directed; and the angle μ is the Greenwich hour angle of this point.

The quantities l_1 and l_2 are the radii of the shadow cones upon the fundamental plane, l_1 corresponding to the penumbra, and l_2 to the umbra; l_2 is regarded as positive for an annular and negative for a total eclipse.

The angles f_1 and f_2 , of which the tangents are given, are the angles which the elements of the respective shadow cones make with the axis of the shadow; or, they are the semi-angles of the two cones.

The quantities x' , y' , and μ' which are the changes of x , y , and μ , in one minute of time, are given at the bottom of the table, μ' being expressed in minutes of arc.

The method of computing local circumstances of an eclipse from its Besselian elements is based on the fact that at the beginning and ending of the eclipse the distance of the observer from the axis of the shadow cones is equal to the radius of the penumbra at the point of observation, and for the beginning and ending of the total or annular phase, is equal to the radius of the umbra at the point of observation.

First, the position of the observer at the approximate time of each phase is computed. For this purpose, find $\rho \cos \phi'$ and $\rho \sin \phi'$, which are the geocentric coordinates of the station referred to the Earth's equator, ρ being the distance from the center of the Earth and ϕ' the geocentric latitude, from the formulas

$$\begin{aligned}\rho \cos \phi' &= (C+H) \cos \phi, \\ \rho \sin \phi' &= (S+H) \sin \phi,\end{aligned}$$

where ϕ is the geographic latitude, and C and S are taken from Table XV, page 560, based on the International Spheroid (see page xvi). The quantity H is the elevation of the observer above sea level, expressed in units of the equatorial radius of the Earth;

$$\begin{aligned}H &= 0.1567794 \times 10^{-6} \times \text{elevation in meters,} \\ H &= 0.0477865 \times 10^{-6} \times \text{elevation in feet.}\end{aligned}$$

or

The introduction of the correction H in the values of $\rho \cos \phi'$ and $\rho \sin \phi'$ is all that is needed if it is desired to compute local circumstances for a place at high altitude or in the ionosphere.

For the assumed time of computation, take from the table of elements the values of $\sin d$, $\cos d$, μ , and μ' . Then if λ is the longitude west from Greenwich, and if

$$\mu - \lambda = h,$$

the coordinates of the observer referred to the fundamental plane are

$$\begin{aligned}\xi &= \rho \cos \phi' \sin h, \\ \eta &= \rho \sin \phi' \cos d - \rho \cos \phi' \sin d \cos h, \\ \zeta &= \rho \sin \phi' \sin d + \rho \cos \phi' \cos d \cos h,\end{aligned}$$

and their variations in one minute of mean time are

$$\begin{aligned}\xi' &= \mu' \sin 1' \rho \cos \phi' \cos h, \\ \eta' &= \mu' \sin 1' \rho \cos \phi' \sin d \sin h = \mu' \sin 1' \xi \sin d, \\ \zeta' &\text{ is not needed.}\end{aligned}$$

For the same assumed time, take from the table of elements the coordinates x and y of the axis of shadow, together with their variations for one minute x' and y' . Then compute the quantities

$$\begin{aligned}u &= x - \xi, \\ v &= y - \eta, \\ u' &= x' - \xi', \\ v' &= y' - \eta' .\end{aligned}$$

Next, both for the umbra and for the penumbra, the radius L at the distance ζ of the observer from the fundamental plane is computed by the formula

$$L = l - \zeta \tan f,$$

l and $\tan f$ being taken from the table of elements. If the time chosen for computation happens to be exactly that of the beginning or ending of the eclipse, or of the total or annular phase, we shall have

$$L^2 = u^2 + v^2.$$

However, this condition is rarely fulfilled on a first trial, and it is necessary to determine a correction τ to the assumed time.

Times of Contacts: To determine the correction τ for the beginning or end of the eclipse, first find the angle ψ from the equation

$$\sin \psi = \frac{1}{nL}(uv' - u'v),$$

where n is given by

$$n^2 = u'^2 + v'^2.$$

There will be two values for this angle, the one for which $\cos \psi$ is negative must be taken for the beginning of the eclipse, for the beginning of the annular phase, or for the ending of the total phase, but the one for which $\cos \psi$ is positive must be taken for the ending of the eclipse, for the ending of the annular phase, or for the beginning of the total phase. The correction to the assumed time will then be found in minutes from

$$\tau = \frac{L \cos \psi}{n} - \frac{uu' + vv'}{n^2}.$$

However, only in case the value of τ does not exceed a few minutes can the time thus corrected be considered even fairly accurate. Therefore it is best to commence the computation by assuming times near the phenomena wanted. The times for the beginning and the ending of an eclipse may be derived from the chart with sufficient exactness as previously explained; the time for the middle of the total or the annular phase may be assumed to be midway between the times assumed for the beginning and the ending of the eclipse; or, in case of a partial eclipse, it may be assumed to be that of the maximum eclipse.

The more accurate times resulting from the computation as outlined above and as illustrated in the example below may now be taken in place of those originally assumed, and the whole computation may be repeated, thus leading to a value of τ in each case, which should be very small, and which should give a very accurate time of the phenomenon. Such a repetition of the computation will be advisable, moreover, for the reason that it will enable one to locate and eliminate any accidental numerical errors that may have occurred in the first computation.

As a result of this last approximation the computed times of contact will be theoretically exact within less than a second, but the uncertainties of the solar and lunar tables are such that an unavoidable error of several seconds may exist in the prediction.

Position Angle of Point of Contact: Compute the angle N from the formula

$$\cot N = \frac{v'}{u'},$$

$\sin N$ having the same algebraic sign as u' . Then the position angle P of the point of contact, reckoned from the north point of the Sun's limb toward the east, is

$$P = N + \psi,$$

where the results of the last approximation are used.

The position angle V of the point of contact, reckoned from the vertex of the Sun's limb toward the east, is

$$V = P - C,$$

where C is obtained from

$$\tan C = \frac{\xi}{\eta},$$

$\sin C$ having the same algebraic sign as ξ , and the results of the last approximation again being used.

Time of Maximum Eclipse: For a partial eclipse, or for a central eclipse at a point at which the eclipse is only partial, indicated by $\sin \psi$ greater than unity for the umbra, the correction to the assumed time to obtain the time of maximum eclipse is

$$\tau = -\frac{1}{n^2}(uu' + vv').$$

For a central eclipse at a point at which the eclipse is total or annular, the above formula gives the correction to the assumed time to obtain the true time of mid-eclipse.

Magnitude of Maximum Partial Eclipse: This is given by the formula

$$D = \frac{L - \Delta}{2L - 0.5459},$$

where $\Delta = \pm \frac{1}{n}(uv' - u'v)$, always taken positive, and L is the radius of the penumbra. In a partial eclipse D is the fraction of the Sun's diameter covered by the Moon; but in all cases D is the ratio to the Sun's diameter of the straight line passing through the centers of the two disks and having for its extremities the Sun's limb that is nearest to the Moon's center and the Moon's limb that is nearest to the Sun's center.

Magnitude during Annular Phase: A , the ratio of the Moon's apparent diameter to the Sun's apparent diameter, or the fraction of the Sun's diameter covered by the Moon, is given by the formula

$$A = \frac{0.5459}{2L - 0.5459}.$$

At mid-eclipse the portion of the Sun's diameter uncovered at the broadest part of the annulus is equal to $1 - D$, and at the narrowest part, to $D - A$. D is computed by the formula already given.

Magnitude during Total Phase: As in the preceding case, A , the ratio of the Moon's apparent diameter to the Sun's apparent diameter (in this case greater than unity) is

$$A = \frac{0.5459}{2L - 0.5459}.$$

At mid-eclipse, however, the least distance between the limb of the Sun and the limb of the Moon, the Sun's diameter being taken as unity, is equal to $D - 1$, and the greatest, to $A - D$.

° ' "

Latitude ϕ = - 10 48 00

Longitude λ = +166 00 00

The geocentric coordinates of this place are

$\rho \sin \phi' = -0.186144$ $\rho \cos \phi' = +0.982407$

From the eclipse chart we find the approximate times of the phases to be

				d h m			
Beginning October				12	18	40	} Universal Time
Middle				12	19	55	
Ending				12	21	10	
T October 12 ^d	Beginning 18 ^h 40 ^m	Middle 19 ^h 55 ^m	Ending 21 ^h 10 ^m	v'	Beginning -0.0032779	Middle -0.0031689	Ending -0.0030181
μ	103 21 36	122 06 53	140 52 11	n^2	0.000064639	0.000048786	0.000038638
λ	166 00 00	166 00 00	166 00 00	n	0.0080398	0.0069847	0.0062159
h	297 21 36	316 06 53	334 52 11	$uv' - u'v$	-0.0000739	+0.0000209	-0.0000405
$\sin h$	-0.888137	-0.693216	-0.424678	$uu' + vv'$	-0.0041536	+0.0003166	+0.0033469
$\rho \cos \phi'$	+0.982407	+0.982407	+0.982407	$\zeta = aA + bB$	+0.471743	+0.726182	+0.906048
$\cos h$	+0.459580	+0.720729	+0.905344	$\tan f$	+0.004686	+0.004662	+0.004686
$a = \rho \cos \phi' \cos h$	+0.451495	+0.708049	+0.889416	$\zeta \tan f$	+0.002211	+0.003385	+0.004246
$A = \cos d$	+0.991637	+0.991594	+0.991551	l	+0.534613	-0.011209	+0.534650
$b = \rho \sin \phi'$	-0.186144	-0.186144	-0.186144	L	+0.532402	-0.014594	+0.530404
$B = \sin d$	-0.129060	-0.129389	-0.129719	nL	+0.0042804	-0.0001019	+0.0032969
x	-1.340498	-0.641990	+0.056667	$\sin \psi$	-0.01726	-0.2051	-0.01228
ξ	-0.872512	-0.681020	-0.417207	$\cos \psi$	-0.99985	± 0.9787	+0.99992
y	+0.092705	-0.116198	-0.324939	$L: n$	66.221	-2.089	85.330
$\eta = Ab - aB$	-0.126317	-0.092966	-0.069197	$L \cos \psi: n$	^m -66.211	^m $\mp$ 2.045	^m +85.323
u	-0.467986	+0.039030	+0.473874	$(uu' + vv'): n^2$	-64.258	+ 6.490	+86.622
v	+0.219022	-0.023232	-0.255742	τ	- 1.953	$\left\{ \begin{array}{l} - 8.535 \\ - 4.445 \end{array} \right\}$	- 1.299
$c = \mu' \sin 1'$	+0.0043645	+0.0043645	+0.0043645	T	^h 18 ^m 40	^h 19 ^m 55	^h 21 ^m 10
$x' = ca$	+0.0093118	+0.0093148	+0.0093160	$T + \tau$	^h 18 ^m 38 ^s 02.8	$\left\{ \begin{array}{l} 19 \ 46 \ 27.9 \\ 19 \ 50 \ 33.3 \end{array} \right\}$	^h 21 ^m 08 ^s 42.1
$y' = cB\xi$	-0.0027864	-0.0027843	-0.0027819				
$\eta' = cB\xi$	+0.0004915	+0.0003846	+0.0002362				
u'	+0.0073413	+0.0062245	+0.0054341				

Taking the four times just found, a new computation is made in each case. The times resulting from the new computation are

		Universal Time	Local Civil Time
		d h m s	d h m s
Beginning of the eclipse	October	12 18 38 02.8	12 07 34 02.8
Beginning of total eclipse		12 19 46 32.8	12 08 42 32.8
Ending of total eclipse		12 19 50 33.5	12 08 46 33.5
Ending of the eclipse		12 21 08 42.2	12 10 04 42.2

The values from the last approximation of the quantities needed in computing the position angles, and the computation of these position angles are

	First Contact	Second Contact	Third Contact	Fourth Contact
u'	+0.007374	+0.006310	+0.006310	+0.005444
v'	-0.003280	-0.003180	-0.003180	-0.003021
$\cot N$	-0.4448	-0.5040	-0.5040	-0.5549
ξ	-0.8763	-0.7067	-0.6946	-0.4222
η	-0.1273	-0.0963	-0.0947	-0.0695
$\cot C$	+0.1453	+0.1363	+0.1363	+0.1646
N	113.98	116.75	116.75	119.03
ψ	181.07	347.78	192.22	359.32
P	295.05	104.53	308.97	118.35
C	261.73	262.24	262.24	260.65
V	33.3	202.3	46.7	217.7

The quantities needed in computing the magnitude of the maximum eclipse, and the computation of that magnitude, are

T	$\begin{smallmatrix} d & h & m \\ 12 & 19 & 49 \end{smallmatrix}$	l_1	0.5347	$2L-0.5459$	0.5169
ξ	0.7068	L	0.5314	D	1.022
$\tan f_1$	0.0047	Δ	0.0031	A (Magnitude)	1.056
$\xi \tan f_1$	0.0033	$L-\Delta$	0.5283	$A-D$	0.034
				$D-1$	0.022

Within several miles of a point for which the preceding computation has been made, the times of the phases at any locality which has nearly the same elevation above sea level may be obtained by computing differential corrections *in which the necessary numerical quantities are already available from the previous calculations.*

The times of first and last contacts at longitude $\lambda+\Delta\lambda$, latitude $\phi+\Delta\phi$, are obtained by adding to the exact times at the position, λ, ϕ , the correction

$$\Delta T = p\Delta\lambda + q\Delta\phi \text{ seconds,}$$

where $\Delta\lambda$ and $\Delta\phi$ are in minutes of arc, and p and q are computed from the formulas

$$p = \frac{60 \sin 1'}{D} (uA_1 + vB_1), \quad q = \frac{60 \sin 1'}{D} (uA_2 + vB_2),$$

in which

$$\begin{aligned} D &= uu' + vv', \\ A_1 &= -a, \\ B_1 &= -\xi \sin d, \\ A_2 &= -C^2 \rho \sin \phi' \sin h, \\ B_2 &= SC \rho \cos \phi' \cos d + C^2 \rho \sin \phi' \sin d \cos h. \end{aligned}$$

The time of mid-totality, middle of the annular phase, or time of greatest eclipse if the eclipse is partial only, at $\lambda+\Delta\lambda, \phi+\Delta\phi$, is obtained by adding to the corresponding time T_m , at λ, ϕ , the correction

$$\Delta T_m = p_m\Delta\lambda + q_m\Delta\phi \text{ seconds,}$$

where

$$p_m = \frac{60 \sin 1'}{n^2} (u'A_1 + v'B_1), \quad q_m = \frac{60 \sin 1'}{n^2} (u'A_2 + v'B_2).$$

When the eclipse is total or annular at $\lambda+\Delta\lambda$, $\phi+\Delta\phi$, the times of second and third contacts are

$T_2=T_m+\Delta T_m-S_1,$

$T_3=T_m+\Delta T_m+S_1,$

in which S_1 is the semiduration at $\lambda+\Delta\lambda$, $\phi+\Delta\phi$, and is obtained as shown in the example below; for this purpose, the value of Δ_m in the final approximation at λ , ϕ , is corrected by the amount $p_1\Delta\lambda+q_1\Delta\phi$, where

$$\Delta_m=\frac{1}{n}(uv'-u'v),$$

$p_1=\frac{\sin 1'}{n}(u'B_1-v'A_1),$

$q_1=\frac{\sin 1'}{n}(u'B_2-v'A_2).$

Computation of the times of the four contacts for $\lambda+\Delta\lambda$, $\phi+\Delta\phi$, using data available in the final computation of the times of contact for λ , ϕ , at the locality of the preceding example.

	Beginning	Middle	Ending
C	1.000118	1.000118	1.000118
S	0.993395	0.993395	0.993395
C ²	1.000236	1.000236	1.000236
SC	0.993512	0.993512	0.993512
u	-0.48235		+0.46681
v	+0.22543		-0.25181
u'		+0.006310	
v'		-0.003180	
(uv'-u'v)		+0.0000217	
sin h	-0.89202	-0.71335	-0.42980
cos h	+0.45199	+0.70081	+0.90292
$\rho \sin \phi'$	-0.18614	-0.18614	-0.18614
$\rho \cos \phi'$	+0.98241	+0.98241	+0.98241
sin d	-0.12905	-0.12936	-0.12971
cos d	+0.99164	+0.99160	+0.99155
ξ	-0.87633	-0.70080	-0.42224
η		-0.09552	
ξ'		+0.003005	
η'		+0.000396	
A ₁	-0.44404	-0.68848	-0.88704
B ₁	-0.11309	-0.09066	-0.05477
A ₂	-0.16608	-0.13281	-0.08002
B ₂	+0.97874	+0.98472	+0.98959
D	-0.004296		+0.003302
60 sin 1':D	-4 ^s .063		+5 ^s .286
n ²		0.00004993	
n		0.007066	
sin 1':n		0.04117	
60 sin 1':n ²		349 ^s .6	
L _u		-0.014505	
$\pm 60 L_u:n$		123 ^s .17	
Δ_m		+0.003071	

Computation of the times of the four contacts—Continued.

	Beginning	Ending		Middle		Middle
uA_1	+0.2142	-0.4141	$u'A_1$	-0.004344	$u'B_1$	-0.000572
vB_1	-0.0255	+0.0138	$v'B_1$	+0.000288	$-v'A_1$	-0.002189
Sum	+0.1887	-0.4003	Sum	-0.004056	Sum	-0.002761
p	-0 ^s .77	-2 ^s .12	p_m	-1 ^s .42	p_1	-0.0001137
uA_2	+0.0801	-0.0374	$u'A_2$	-0.000838	$u'B_2$	+0.006214
vB_2	+0.2206	-0.2492	$v'B_2$	-0.003131	$-v'A_2$	-0.000422
Sum	+0.3007	-0.2866	Sum	-0.003969	Sum	+0.005792
q	-1 ^s .22	-1 ^s .51	q_m	-1 ^s .39	q_1	+0.0002385

The Universal Times of the four contacts for the position $\lambda + \Delta\lambda$, $\phi + \Delta\phi$, are, therefore,

$$\begin{aligned}
 T_1 &= 18 \quad 38 \quad 02.8 - 0.77\Delta\lambda - 1.22\Delta\phi \\
 T_2 &= 19 \quad 48 \quad 33.1 - 1.42\Delta\lambda - 1.39\Delta\phi - S_1 \\
 T_3 &= 19 \quad 48 \quad 33.1 - 1.42\Delta\lambda - 1.39\Delta\phi + S_1 \\
 T_4 &= 21 \quad 08 \quad 42.2 - 2.12\Delta\lambda - 1.51\Delta\phi
 \end{aligned}$$

The semiduration S_1 of the total, or annular phase at $\lambda + \Delta\lambda$, $\phi + \Delta\phi$, is obtained as follows:

$$\begin{aligned}
 \sin \psi_1 &= \frac{\Delta_1}{L_u}, \\
 \text{in which} \quad \Delta_1 &= \Delta_m + p_1\Delta\lambda + q_1\Delta\phi, \\
 \text{and} \quad S_1 &= \pm \frac{60L_u}{n} \cos \psi_1 = \pm 123^s.17 \cos \psi_1, \text{ always taken positive.}
 \end{aligned}$$

Substituting values for Δ_m , p_1 , and q_1 ,

$$\begin{aligned}
 \Delta_1 &= +0.003071 - 0.0001137\Delta\lambda + 0.0002385\Delta\phi, \\
 \sin \psi_1 &= -0.2117 + 0.00784 \Delta\lambda - 0.01644 \Delta\phi.
 \end{aligned}$$

To obtain the angle C for second and third contacts at $\lambda + \Delta\lambda$, $\phi + \Delta\phi$, use the equation

$$\tan C = \frac{\xi \mp \xi' S_1}{\eta \mp \eta' S_1}.$$

Upper signs are for second contact, lower signs for third. ξ , η , ξ' , η' are for the middle of the eclipse at λ , ϕ , and will be found above. S_1 is to be expressed in minutes. $\sin C$ has the same algebraic sign as $(\xi \mp \xi' S_1)$.

The angles P and V are computed by

$$\begin{aligned}
 P &= N + \psi_1, \\
 P - C &= V.
 \end{aligned}$$

N may be assumed constant for small distances from λ , ϕ ; ψ_1 is obtained from the above computation of S_1 . In determining the quadrant of ψ_1 for the two contacts, note that in a total eclipse $\cos \psi_1$ is positive for second contact, negative for third contact, the reverse in an annular eclipse.

OCCULTATIONS

Pages 315–325 contain the names, magnitudes, mean places, and annual proper motions of stars brighter than magnitude 7.55, that may be occulted by the Moon during the year.

Pages 326–369 contain the elements for the prediction of occultations of the stars listed on pages 315–325, and of planets, with the following exceptions. No elements are given if the occultation is a grazing one, visible only from points north of latitude $+50^\circ$ or south of latitude -50° . Near New Moon, elements are given only as far as is necessary to make certain that at any point on the earth all other occultations occurring more than 48 hours from New Moon are included. For stars fainter than magnitude 3.0, elements are given near Full Moon only as far as is necessary to include all occultations occurring more than 24 hours from Full Moon, unless the Moon is eclipsed, in which case elements are given for all stars occulted during the eclipse. For stars fainter than magnitude 6.5, elements are given only as far as is necessary to include all occultations occurring from 48 hours after New Moon to 72 hours before Full Moon, unless during an eclipse.

The system of coordinates employed is similar to that already described for eclipses. The fundamental plane passes through the center of the Earth, and is taken perpendicular to the line joining the star and the center of the Moon, but since the distance of the star is very great the Moon's shadow is regarded as a cylinder which intersects the fundamental plane in a circle having the same linear diameter as that of the Moon.

In the columns referring to the star, its apparent place is for the time of occultation. In computing the positions the formulas on page 246 have been used, including the term E , and omitting terms of short period.

The column T gives the time at which the two bodies are in geocentric conjunction in right ascension. At that moment the coordinate x of the axis of the cylinder on the fundamental plane has the value zero. The column H gives the common geocentric hour angle of the Moon and star at the same moment, counted from the meridian of Greenwich—positive toward the west and negative toward the east. Column Y gives the coordinate y of the axis of the cylinder upon the fundamental plane at the same moment. Columns x' and y' give the variations of x and y in one hour of mean time. The linear unit in these columns is the Earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

With the aid of these elements, the times of immersion and emersion of a star relative to the limb of the Moon may be computed for any place where the occultation is visible by a method similar in some respects to that used in computing local circumstances of eclipses.

Prediction of Occultations for a Given Place.—When it is desired to predict the circumstances of one or more occultations at any place, the first step will be to select them from the general list given in the Ephemeris. The conditions of visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.
2. The quantity $H-\lambda$, taken without regard to sign, must be less than the semi-diurnal arc of the star by at least one hour. On very rare occasions an emersion might be seen in the east, or an immersion in the west, when this difference is a few minutes less than an hour.

3. The Sun must not be much more than an hour above the horizon at the local civil time $T-\lambda$, unless the star is bright enough to be seen in the daytime.

When many occultations are to be selected, the most convenient course will be to write the value of $-\lambda$ on the bottom of a slip of paper, and in passing through the list of occultations to pause over each one for which condition (1) is fulfilled, and examine with the aid of the slip whether conditions (2) and (3) are also fulfilled. If either fails, the occultation is omitted. Sometimes it will be difficult to determine whether $H-\lambda$ or $T-\lambda$ falls within the limits; and in such cases the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in two or three hours, and it will probably be found that about one-tenth of the occultations are marked for trial.

The next step will be to compute the local times of immersion and emersion from the elements, and to that end let—

T =the instant of geocentric conjunction of Moon and star in right ascension, expressed in Universal Time;

H =the Greenwich hour angle of the two bodies at that moment;

λ =the longitude west of Greenwich;

$h_o = H - \lambda$ =the local hour angle of the star at the instant T ;

δ =the star's declination.

The procedure for each occultation will then be as follows:

(1) The geocentric coordinates of the place, $\rho \sin \phi'$ and $\rho \cos \phi'$, are to be computed by Table XV, page 560.

The next step will be to find the approximate instant of apparent conjunction of the Moon and star as seen from the place. This may be deduced from the time of geocentric conjunction by the application of an approximate correction t , which will be reckoned in mean solar hours, and will have the same sign as h_o . This approximate correction may be determined in any way preferred by the computer; but a good value may be obtained from the formulas

$$\begin{aligned}\xi_o &= \rho \cos \phi' \sin h_o, \\ \xi_o' &= 0.2625 \rho \cos \phi' \cos \frac{4}{3} h_o, \\ t &= \frac{\xi_o}{x' - \xi_o'}\end{aligned}$$

in which the factor $\cos (4/3) h_o$ is arbitrary.

By applying t to the time of geocentric conjunction, as given with the elements, we shall have the Universal Time of local conjunction within a few minutes.

(2) Compute for the instant $T+t$ the following quantities, in which t_o is the sidereal equivalent of the mean time interval t :

$$\begin{aligned}h &= h_o + t_o, \\ \xi &= \rho \cos \phi' \sin h, \\ \eta &= \rho \sin \phi' \cos \delta - \rho \cos \phi' \sin \delta \cos h = \eta_1 - \eta_2, \\ \xi' &= 0.2625 \rho \cos \phi' \cos h, \\ \eta' &= 0.2625 \rho \cos \phi' \sin \delta \sin h = 0.2625 \xi \sin \delta, \\ x &= x' t, \\ y &= Y + y' t.\end{aligned}$$

Compute also n , N , and ψ from the equations

$$\begin{aligned}u &= x - \xi, \\ v &= y - \eta, \\ u' &= x' - \xi', \\ v' &= y' - \eta', \\ n^2 &= u'^2 + v'^2, \\ \sin \psi &= \frac{3.6697}{n} (uv' - u'v), \\ \tan N &= \frac{u'}{v'}.\end{aligned}$$

ψ being taken between the limits $\pm 90^\circ$, and $\sin N$ having the same sign as u' .

Finally compute

$$\tau = -\frac{60}{n^2} (uu' + vv') \mp \frac{16.35}{n} \cos \psi = \tau_1 \mp \tau_2,$$

and the correction

$$\delta\tau = \frac{0.0005742\tau^2}{n \cos \psi} [\eta_2 \cos (N \mp \psi) - \xi \sin (N \mp \psi)],$$

which is derived in *Astronomical Journal*, vol. 41, page 50.

The double signs are to be taken negative for an immersion and positive for an emersion. Both τ and $\delta\tau$ thus have two values, which are expressed in minutes of time, and in order to distinguish them let those pertaining to immersion be designated, respectively, τ' and $\delta\tau'$, while those pertaining to emersion are designated τ'' and $\delta\tau''$. We then have for the Universal Times of the phases:

$$\begin{aligned}\text{Instant of immersion} &= T + t + \tau' + \delta\tau', \\ \text{Instant of emersion} &= T + t + \tau'' + \delta\tau''.\end{aligned}$$

The corrections $\delta\tau$ seldom amount to as much as 1.5 minutes, and whenever an inaccuracy of that magnitude is permissible they may be omitted. As a check upon the results it will be advisable to compute ξ , η , x , and y for the times of immersion and emersion finally obtained. If these times are correct, the quantities will fulfill the condition

$$\sqrt{(x-\xi)^2+(y-\eta)^2}=0.2725.$$

If $\frac{1}{n}(uv'-u'v)>0.2725$, $\sin \psi$ will be numerically greater than unity, and no occultation is to be expected at the given place; but a very brief one may occur if the excess of the computed distance over the Moon's semidiameter happens to be within the errors of the ephemerides of the Moon and star.

The position angle of the line from the Moon's center to the star, at the time of contact, is reckoned from the north point toward the east, and designated by the symbol P . It is computed from the formulas

$$\begin{array}{ll} P=N-\psi+\delta P & \text{for immersion,} \\ \text{or } P=N+\psi+\delta P\pm 180^\circ & \text{for emersion,} \end{array}$$

where δP is found in degrees of arc from the expression

$$\delta P=\mp \frac{0.002013\tau^2}{n \cos \psi}(u'\eta_2+v'\xi).$$

In the last formula the double sign is to be taken negative for an immersion and positive for an emersion.

The angle from the vertex, V , is also reckoned in the direction from the north toward the east, and is found from the formula

$$V=P-C,$$

where C is computed from the expression

$$\tan C=\frac{\xi+0.01667\tau\xi'-0.00000957\tau^2\xi}{\eta+0.01667\tau\eta'+0.00000957\tau^2\eta_2},$$

C being taken less or greater than 180° , according as the numerator is positive or negative.

The value of τ employed in the latter formula must be so taken as to correspond with the phase for which C is required.

As an example of an isolated occultation we will compute that of α Virginis on January 12, 1958 for Seattle, Washington. Five place trigonometric tables were used in the computation of this example.

$$\begin{array}{ll} \text{Latitude, } \phi=+47^\circ 36' \\ \text{Longitude, } \lambda=+8^h 09^m.4 \end{array}$$

The geocentric coordinates of this place (including altitude) are

$$\begin{array}{l} \rho \sin \phi'=0.7348 \\ \rho \cos \phi'=0.6755 \end{array}$$

From the elements on page 327 we have

$$\begin{array}{rcccl} & d & h & m & \\ T= & 12 & 15 & 51.3 & \\ H= & + & 9 & 54.8 & \\ h_o=H-\lambda= & + & 1 & 45.4 & \end{array}$$

From the formulas on page 581 we find the correction, t , to the time of geocentric conjunction, T , to be $+0^h.7087$ or about $+0^h 42^m.5$; therefore the approximate Universal Time of local apparent conjunction is

$T+t=\text{January } 12^d 16^h 33^m.8$

α Virginis	Apparent Declination	U. T. of σ	Hour Angle	Y	z'	y'
	$^{\circ}$ $'$	d h m	h m			
	-10 56.6	Jan. 12 15 51.3	+9 54.8	+0.8573	0.5680	-0.1731

h_o	h m +1 45.4	y $\eta_1=AB$	+0.7346	n^2	0.2052
t_o	+0 42.6	$\eta_2=ab$	+0.7214	n	0.4530
h	+2 28.0	η	-0.1024	$uv'-u'v$	+0.0386
			+0.8238	$(uv'-u'v):n$	+0.0852
$\sin h$	+0.6018			$\sin \psi$	+0.3127
$\rho \cos \phi'$	+0.6755	u	-0.0040	$\cos \psi$	0.9498
$\cos h$	+0.7986	v	-0.0892	$uu'+vv'$	+0.0119
				$(uu'+vv'):n^2$	+0.0580
$a=\rho \cos \phi' \cos h$	+0.5395	x'	+0.5680	τ_1	m -3.48
$A=\cos \delta$	+0.9818	ξ'	+0.1416	$\cos \psi:n$	2.0967
$B=\rho \sin \phi'$	+0.7348	y'	-0.1731		m
$b=\sin \delta$	-0.1898	η'	-0.0203	τ_2	∓ 34.28
					m
x	+0.4025	u'	+0.4264	τ for immersion	-37.76
ξ	+0.4065	v'	-0.1528	τ for emersion	+30.80

The computation of $\delta\tau$ and δP for the two contacts is as follows:

	Immersion	Emersion		Immersion	Emersion
$\cot N$	-0.3583	-0.3583	$n \cos \psi$	0.4303	0.4303
	$^{\circ}$ $'$	$^{\circ}$ $'$	τ^2	1425.8	948.6
N	109 43	109 43	$\tau^2:(n \cos \psi)$	3313.5	2204.5
ψ	18 13	18 13			
$N\mp\psi$	91 30	127 56	$0.0005742 \tau^2:(n \cos \psi)$	1.903	1.266
$\cos (N\mp\psi)$	-0.0262	-0.6147	$\delta\tau$	m -0.77	m -0.33
$\sin (N\mp\psi)$	+0.9997	+0.7887			
$\eta_2 \cos (N\mp\psi)$	+0.0027	+0.0629	$0.002013 \tau^2:(n \cos \psi)$	6.670	4.438
$\xi \sin (N\mp\psi)$	+0.4064	+0.3206	$u'\eta_2+v'\xi$	-0.1058	-0.1058
Diff.	-0.4037	-0.2577	δP	$^{\circ}$ +0.7	$^{\circ}$ -0.5

To find the local civil times of contacts and P :

	Immersion	Emersion		Immersion	Emersion
	d h m	h m		$^{\circ}$	$^{\circ}$
$T+t$	January 12 16 33.8	16 33.8	$N\mp\psi$	91.5	127.9
τ	-37.76	+30.80	δP	+ 0.7	- 0.5
$\delta\tau$	- 0.77	- 0.33	const.	0.0	180.0
U. T.	15 55.3	17 04.3	P	92	307
λ	8 09.4	8 09.4			
	d h m	h m			
Local C. T.	January 12 07 45.9	08 54.9			

Pages 370-376 contain for five stations in the United States and one in Canada, designated "standard" stations, all the data necessary for observing every occultation for which elements are furnished, and which is visible under favorable circumstances; immersion is denoted by D, emersion by R. Each page contains the predictions for two neighboring standard stations; when an occultation is predicted for one station but not for the other, the reason is given. Star names on this list have the constellation name enclosed in brackets if the star does not lie within the DELPORTE constellation limits.

The *Age of the Moon* is the age at the time of geocentric conjunction, and it may differ by 0^d.1 from the age at the time of occultation.

The quantities *a* and *b* immediately following the time of the phenomenon and on the same line with it are the variations of that time per degree of longitude and per degree of latitude, respectively. By means of these quantities moderately accurate times of the phenomena can be obtained for neighboring stations within two or three hundred miles of the standard station. Let λ_o , ϕ_o , be the west longitude and latitude of the standard station, and λ , ϕ , the west longitude and latitude of the neighboring station. Then, for the neighboring station we have

U. T. of phenomenon=U. T. at standard station+*a*($\lambda-\lambda_o$)+*b*($\phi-\phi_o$)

where ($\lambda-\lambda_o$) and ($\phi-\phi_o$) are expressed in degrees and tenths of a degree. This method is unreliable for grazing occultations, and for these the quantities *a* and *b* are omitted.

For Washington $\lambda_o=+77^{\circ}.1$ and $\phi_o=+38^{\circ}.9$.

As an example, find the times of immersion and emersion of α Virginis on January 12, 1958, at Seattle, Washington, longitude $+122^{\circ}.4$, latitude $+47^{\circ}.6$. The nearest standard station is that in longitude $+123^{\circ}.1$, latitude $+49^{\circ}.5$, hence, $\lambda-\lambda_o=-0^{\circ}.7$ and $\phi-\phi_o=-1^{\circ}.9$.

	Immersion		Emersion	
	h	m	h	m
U. T., standard station, page 374.	15	52.6	17	00.1
<i>a</i> ($\lambda-\lambda_o$)		+1.0		+0.7
<i>b</i> ($\phi-\phi_o$)		+1.5		+3.4
Approximate U. T. at Seattle	15	55	17	04

For distances up to 200 miles the error in the times so obtained is unlikely to be much greater than one minute; it may rise to two minutes for distances up to 300 miles.

An allowance for the neglected higher-order terms may be made by applying to the times thus calculated the correction

$0^m.075 \cos^2 \phi_o (\phi-\phi_o)^2,$

given in the table below:

$\phi-\phi_o \backslash \phi_o$	0°	10°	20°	30°	40°	50°	60°
°	m	m	m	m	m	m	m
1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
2	0.3	0.3	0.3	0.2	0.2	0.1	0.1
3	0.7	0.7	0.6	0.5	0.4	0.3	0.2
4	1.2	1.2	1.1	0.9	0.7	0.5	0.3
5	1.9	1.8	1.7	1.4	1.1	0.8	0.5
6	3	3	2.4	2.0	1.6	1.1	0.7
7	4	4	3	3	2.2	1.5	0.9
8	5	5	4	4	3	2.0	1.2

This correction is to be *added* for immersion and *subtracted* for emersion. With this correction, times will rarely be in error by more than one minute for distances up to about 250 miles; and the accuracy over shorter distances will be improved.

At a place between two standard stations, for both of which a and b coefficients are given, still greater accuracy can be obtained by working from the nearer station, using a and b coefficients modified as follows: assuming that a and b vary linearly with latitude, the modified a and b are those appropriate to the mean of the latitudes of the standard station and the place concerned. If $a_1, b_1, \phi_1; a_2, b_2, \phi_2$ refer to the two standard stations and ϕ is the latitude of the place, then the modified coefficients are:

$$a = a_1 + q (a_2 - a_1); \quad b = b_1 + q (b_2 - b_1)$$

where

$$q = (\phi - \phi_1) : 2(\phi_2 - \phi_1).$$

The times so obtained will generally be within one minute for distances up to 300 miles. This method should not be used if the difference of latitude between the two standard stations is less than one degree.

PART IV—PHYSICAL EPHEMERIDES OF THE SUN, MOON, AND PLANETS

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN

Pages 379–382 contain the *Ephemeris for Physical Observations of the Sun*.

P = the position angle of the axis of rotation, measured eastward from the north point of the disk.

B_o = the heliographic latitude of the center of the disk.

L_o = the heliographic longitude of the center of the disk, reckoned from the Solar Meridian which passed through the ascending node of the Sun's equator on the ecliptic, on January 1, 1854, Greenwich Mean Noon.

MOON'S EQUATOR, ORBIT, ETC.

Page 383 contains certain elements referring to the Moon, its equator, and its orbit.

i = the inclination of the Moon's mean equator to the Earth's true equator.

Δ = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic of date.

Ω' = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator.

Γ' = the mean longitude of the perigee of the Moon's orbit, referred to the mean equinox of date, measured in the ecliptic to the mean ascending node, then along the orbit.

Ω = the mean longitude of the ascending node of the Moon's orbit on the ecliptic, referred to the mean equinox of date.

$\mathcal{C}$ = the Moon's mean longitude, referred to the mean equinox of date, measured like Γ' .

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON

Pages 384–391 contain for 0^h of each day the *Selenographic Longitude and Latitude of the Earth*, *Physical Libration in Longitude and in Latitude*, the *Selenographic Colongitude and Latitude of the Sun*, the *Position Angles of the Moon's Axis*, and *Terminator*, and the *Fraction of the Moon's Disk Illuminated*.

The selenographic longitudes are measured in the plane of the Moon's equator, positive toward the west—i. e., toward Mare Crisium—the axis of reference being the radius of the Moon which passes through the mean center of the visible disk. The latitudes are measured from the Moon's equator, positive toward the north—i. e., in the hemisphere containing Mare Serenitatis.

When the libration in longitude is positive, the mean center of the disk is displaced toward the east—that is, the region thus exposed to view is on the west limb—and when the libration in latitude is positive the mean center of the disk is displaced toward the south—that is, the region thus exposed to view is on the north limb.

The altitude of the Sun, A , at any given time above the horizon of any point on the Moon whose selenographic longitude and latitude, λ and β , are known, may be computed from the following formula, the Sun's selenographic longitude and latitude being denoted by $l_{\odot}$ and $b_{\odot}$, respectively:

$$\sin A = \sin b_{\odot} \sin \beta + \cos b_{\odot} \cos \beta \cos (l_{\odot} - \lambda)$$

DISKS OF MERCURY AND VENUS

Pages 392–393 contain the data with reference to the *Illuminated Disks of Mercury and Venus*. The angle θ is the angle which the arc of the great circle from the planet to the Sun makes with the arc from the planet toward the west, measured from 0° to 360° in the direction west, north, east, south; and is the same as the position angle of the line of cusps. At meridian transit, it is the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps being the direction in which this line must be followed to have the illuminated portion of the disk on the right.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS

Pages 394–401 contain the *Ephemeris for Physical Observations of Mars*. The quantities here given have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

P = the position angle of the axis of rotation measured eastward from the north point of the disk.

$A_{\oplus}$, $A_{\odot}$ = the planetocentric right ascensions of the Earth and Sun, respectively, measured in the plane of the planet's equator from its vernal equinox.

$D_{\oplus}$, $D_{\odot}$ = the planetocentric declinations of the Earth and Sun, respectively, referred to the planet's equator.

$\odot\sigma$ = the planetocentric longitude of the Sun measured in the plane of the planet's orbit from its vernal equinox.

k = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

i = the angle between the Sun and the Earth as seen from the planet.

q = the angular value of the greatest defect of illumination as seen from the Earth.

Q = the position angle of the radius of the disk which passes through the point of greatest defect of illumination—that is, of the radius perpendicular to the line joining the cusps. It is measured eastward from the north point of the disk.

The column headed *Central Meridian* contains the longitude of the meridian which bisects the disk, measured from the adopted zero meridian.

The columns headed *Civil Time of Transit of Zero Meridian* contain the Universal Time of every transit of the zero meridian across the actual center of the disk.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER

Pages 402–405 contain the *Ephemeris for Physical Observations of Jupiter*.

The columns headed *Central Meridian* contain the longitudes of the meridian which bisects the true disk, measured from the adopted zero meridian of System I and System II, respectively. System I applies to all points on or between the north component of the south equatorial belt and the south component of the north equatorial belt; System II applies north of the south component of the north equatorial belt and south of the north component of the south equatorial belt.

The column headed *Correction for Phase* contains the corrections to be applied to the longitudes of the central meridian of the true disk to obtain the longitudes of the central meridian of the illuminated disk.

The pages headed *Longitude of Central Meridian of Illuminated Disk* contain for 0^h of each day the longitude of the meridian which bisects the illuminated disk.

The quantities in the remaining columns on these pages are the same as those defined under the *Ephemeris for Physical Observations of Mars*.

PART V—SATELLITES

The ephemerides of the satellites are intended for search and identification only, not for comparison of theory with observation.

In the tables for finding the position angle p (measured in the usual way from north toward east) and the apparent distance s from the center of the planet, P denotes the position angle of one extremity of the major axis of the apparent orbit; and $a(\rho)/\rho$ is the apparent length of the semimajor axis, where a denotes the semimajor axis in seconds of arc at the mean distance (ρ) of the primary, $a(\rho)$ is consequently the apparent semimajor axis at unit distance, and ρ denotes the geocentric distance of the primary. P_0 is an arbitrary integral number of degrees near the value of P at opposition; p^1 is the sum of P_0 and the motion in position angle since elongation, and therefore its value at elongation is P_0 . F is the ratio of the apparent distance s to the distance at elongation. In computing F and p^1 , the value of the eccentricity of the apparent orbit at opposition is used; hence in the values of s and p which are derived from them, the effect of the variation of the eccentricity of the apparent orbit is neglected.

SATELLITES OF MARS

Pages 408–411 contain, concerning the *Satellites of Mars*, the diagram of their orbits, the times of their elongations, and tables for predicting their position angles and distances from the center of the planet.

SATELLITES OF JUPITER

Pages 412–437 contain, concerning the *Satellites of Jupiter*, the diagram of the orbits of Satellites I–V, the times of conjunction of Satellites I–IV, the times of elongation of Satellite V, the differences in right ascension and declination between Jupiter and Satellites VI and VII, and the phenomena of Satellites I–IV together with their configurations.

MAGNITUDE AND RINGS OF SATURN

Page 438 contains the *Magnitude of Saturn* and the *Elements of the Rings*.

a , b =the major axis and minor axis, respectively, of the outer ellipse of the outer ring.

P =the position angle of the northern semi-minor axis of the rings, measured from the north, positive toward the east.

B =the Saturnicentric latitude of the Earth referred to the plane of the rings, positive toward the north.

$U+180^\circ$ =the Saturnicentric longitude of the Earth measured in the plane of the rings from their ascending node on the Earth's mean equator.

ω =the distance in the plane of the rings from their ascending node on the Earth's mean equator to their ascending node on the ecliptic.

B' =the Saturnicentric latitude of the Sun referred to the plane of the rings, positive toward the north.

$U'+180^\circ$ =the Saturnicentric longitude of the Sun measured in the plane of the rings from their ascending node on the ecliptic.

SATELLITES OF SATURN

Pages 439–448 contain, concerning the *Satellites of Saturn*, the diagram of the orbits of the seven inner satellites, the times of elongation for the first eight satellites, the differences in right ascension and declination between Saturn and Phoebe, the ninth satellite, and tables for predicting the position angles and distances of the first eight satellites from the center of the planet.

SATELLITES OF URANUS AND NEPTUNE

Pages 449–452 contain, concerning the *Satellites of Uranus and Neptune*, the times of the greatest elongations, tables for predicting the position angles and distances from the center of the planet, and diagrams of the orbits, of Satellites I–IV of Uranus, and of Triton.

PART VI—MISCELLANEOUS TABLES

SUNRISE, SUNSET, AND TWILIGHT

Pages 454–461 contain a table for finding the time of *Sunrise* and *Sunset* at any place between the equator and 60° north latitude, assuming this to be the instant when the true zenith distance of the Sun's center is 90° 50'; i. e., when the apparent zenith distance of the Sun's upper limb is 90°, 34' having been allowed for horizontal refraction and 16' for semidiameter. This table gives also the time of beginning and ending of *Twilight*, assuming this to be the instant when the true zenith distance of the Sun's center is 108°. The last two pages contain data which enable the table to be used for southern latitudes.

MOONRISE AND MOONSET

Pages 462–494 contain a table for finding the time of *Moonrise* and *Moonset* at any place between 60° north latitude and 60° south latitude, assuming this to be the instant when the true geocentric zenith distance of the Moon's center is 90° 34' + Semidiameter—Parallax; i. e., when the upper limb is apparently on the horizon, 34' having been allowed for horizontal refraction, as in the case of the Sun.

ANGULAR DISTANCE OF MOON FROM SUN

Pages 496–497 contain the angular distances between the centers of the Sun and Moon for 0^h and 12^h of each day, except for dates near the time of New Moon.

PLANETARY CONFIGURATIONS

Pages 498–499 contain the *Phenomena*, or the configurations of the Sun, Moon, and the planets, expressed in the following symbols:

- ♌ Conjunction, or having the same Longitude or Right Ascension.
- ♍ Opposition, or differing 180° in Longitude or Right Ascension.
- Quadrature, or having a geocentric angular distance of 90°.
- ♊ Ascending Node.
- ♋ Descending Node.

- ☉ The Sun.
- ☾ The Moon.
- ☿ Mercury.
- ♀ Venus.
- ⊕ The Earth.
- ♂ Mars.

- ♃ Jupiter.
- ♄ Saturn.
- ♅ Uranus.
- ♆ Neptune.
- ♇ Pluto.

The predicted times of the conjunctions and oppositions of the planets with respect to the Sun are, respectively, the instants when the longitude of each planet differs from that of the Sun by 0° or 180°. For quadratures the predicted times are the instants when the geocentric angular distance between the Sun and the planet is 90°. For the conjunctions of the planets with the Moon and with one another, the predicted times are the instants when the two bodies have the same right ascension. In the case of conjunction the degrees and minutes to the right indicate the difference of declination. Thus, ♌ ♂ ☾ . . . ♂ -4° 22' would be read "Conjunction of Mars with the Moon, Mars, 4° 22' to the south in

geocentric declination." The apparent difference in declination of the planet and the Moon as seen from the surface of the Earth will depend upon the observer's position. For the conjunctions of Mercury and Venus with the Sun, the distance in geocentric latitude of the planet from the Sun is given.

These pages contain also the times of the perihelion and aphelion passages of the planets, including the Earth; of the passage of the planets through the nodes of their orbits upon the ecliptic; of the greatest heliocentric latitudes of the planets; of the planets becoming stationary in right ascension; of the greatest elongations of Mercury and Venus; of the greatest brilliancy of Venus; of the nearest approach of Mars to the Earth; of the solar and lunar eclipses; and of the sun entering Υ (Aries), ♋ (Cancer), ♎ (Libra), ♏ (Capricornus), which in the northern hemisphere are, respectively, the beginning of spring, summer autumn, and winter.

OBSERVATORIES

Pages 500–513 contain the *Positions of Observatories*. The latitudes are, for the most part, astronomical. In some instances they have been determined by geodetic triangulation from other points. In computing the geocentric coordinates $\rho \sin \phi'$ and $\rho \cos \phi'$ the flattening given on page xvi is used; the effect of altitude is included in every case where it is known.

The quantities Δxy and ΔZ are the parallax constants defined by

$$\begin{aligned}\Delta xy &= -\rho \cos \phi' \sin 8''.80 = -426.64 \rho \cos \phi' \times 10^{-7}, \\ \Delta Z &= -\rho \sin \phi' \sin 8''.80 = -426.64 \rho \sin \phi' \times 10^{-7}.\end{aligned}$$

The footnotes on the right-hand pages give all the formulas necessary for parallax corrections. When the geocentric distances of observed objects are not known, the values of ΔX , ΔY , ΔZ (given in units of the seventh decimal) are to be added to the equatorial rectangular coordinates of the Sun in order to eliminate the parallax.

Pages 514–516 contain an *Index List* for finding observatories that are better known by special names than by geographical places.

MISCELLANEOUS

Pages 518–521 contain the *Apparent Place of Polaris* for each upper transit at Greenwich. The short period terms are given separately for each date.

Pages 522–560 contain a series of tables numbered from I to XV.

Table I—*For Finding the Latitude by an Observed Altitude of Polaris.*

Table II—*For converting Sidereal Into Mean Solar Time.*

Table III—*For converting Mean Solar into Sidereal Time.*

Table IV—*For finding the Azimuth of Polaris at All Hour Angles.*

Table V—*For finding the Azimuth of Polaris at Elongation.*

Table VI—*For Finding, by Observation, When Polaris Passes the Meridian.*

Table VII—*For finding the Apparent Place, Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, of Polaris.*

Table VIII—*Constants for the Reduction of the Mean Places of Stars.*

Table IX, IXA—*For finding the Julian Day Number for any date before A. D. 2100.*

Table X—*Conversion of Arc to Time.*

Table XI—*Conversion of Time to Arc.*

Table XII—*Conversion of Hours, Minutes, and Seconds to Decimals of a Day.*

Table XIII—*Everett Coefficients of the Second Difference.*

Table XIV—*Besselian Interpolation Coefficients.*

Table XV—*For Computing the Geocentric Coordinates of a Place.*

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